THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

EDITORIAL, ADVERTISING AND PUBLISHING OFFICE :
Dorset House, Stamford Street, London, S.E.1
Telegraphic Address : "Ageekay, Sedist, London." Code, A B C.
Telephone No. : Waterloo 3333 (50 lines).
Subscription Rates, Postage free : United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."
Index to Advertisers p. xl. Classified Advertisements—Supp. II.

Vol. CXXV. No. 3219 AUGUST 4, 1939 Price SIXPENCE

Motor Survey

Results of an Extensive Investigation

DURING the course of numerous visits to factories and workings covering many industries throughout the country we have constantly found such conditions as a number of similar motors driving machines with drastically different operating characteristics or several widely differing types of motors all employed on precisely similar duties, and never have we been able to find out quite why or how such a state of affairs has come about—apart from mere chance or accident.

In the vast majority of works there is no properly organised electrical department and quite often the motors are left in the care of men whose main duty is to look after the driven machinery or even the product therefrom.

It is works of this class to which we refer mainly—not entirely. Sometimes even the electrical man—so engrossed in the kWh consumption per yard, pound or pint of the works product, on keeping his installation kVA maximum demand for the month below the "permissible" figure, or in steering clear of the supply undertaking's power-factor penalty—does not appear always to appreciate that one type of motor will give him better service than another or even help him better to achieve those above mentioned objects for which he strives so ardently. And the influence of the type of driving unit on the works product is often an all-important consideration which is overlooked.

Our Aim

We have come across such conditions and considerations as the above so frequently and so regularly that over a number of years the conviction has been steadily built up in our mind that the ELECTRICAL REVIEW could and should do some useful educational work by pointing to the difficulties which face, not only the user, but also the manufacturer, the contractor and even the supply man in connection with the necessity of selecting and recommending the right type of power unit for a particular set of duties and thus encourage an outlook which will foster the vitally essential co-operation of all concerned.

To these ends we solicited and were readily granted the collaboration of many of the motor manufacturers throughout Great Britain, and during the past month or so we have conducted an intensive investigation into the applications of electric motors, with the result that we have prepared a series of articles, the first of which will be published in the ELECTRICAL REVIEW next week.

Candidly, when we were able to properly size up our subject after the first few visits we were almost appalled by its magnitude, but we found the aspects to be considered so varied and far-reaching and the attitude of the manufacturers so helpful that the task has proved to be one of the most interesting we have tackled for a few years.

Selection of Cases

Probably if we had spent double the time on our investigation we should not have been able to delve into every known motor application, and if we were able to double the large amount of space we are allotting to the subject we should not be able to comment on them all, but in the course of the articles we shall refer to a very large number of applications, all specially selected for a particular reason.

New industries and applications are cropping up almost daily, and in nearly every case it is found that the characteristics of the new machinery to be driven can be compared closely with one or other of the already established applications for which a satisfactory motor has been evolved, from the point of view of some particular aspect of motor duty. Broadly the principal of these aspects are : general influences, standardisation, performance, group and individual driving, noise elimination, catering for speeds, ventilation, enclosures, heavy duty, medium duty and domestic, and we have, therefore, arranged our articles as sectional discussions on these varied considerations.

In referring to standardisation we use the word in the sense which governs the development of the general-purpose motor, a development which at the moment is somewhat confusing. On the one hand there is a tendency to limit it to the simplest possible equipment and on the other hand to widen its field by certain inroads into that of the special designs. It seems that the greater the use made of the general-purpose motor the more is the need for special types emphasised, while increased use of special types brings with it a louder call for the general-purpose motor.

Effective Research

BECAUSE only a small proportion of the investigations initiated in an industrial laboratory yield the results originally sought, and also because they so often open up side-avenues that appear more interesting than the main road, the young research worker is particularly prone to the temptation to delay his conclusions. There is probably, as Mr. H. Warren stated in his lecture to the Rugby Engineering Society last session, a greater possibility of ineffectiveness that remains undetected in research than in other kinds of work. Yet the ability to get things done is quite as important as it is recognised to be in the workshop, and the beginner should set out with the conviction that "successful industrial research is the arrival at a definite result." For the man who has grasped this principle, the material reward is not less than in other branches of manufacturing. In addition, there is the less tangible reward that comes from having helped to achieve results of real value, such as those mentioned by Mr. Warren in the article which he contributes to this issue.

Unenlightened

IN the House of Commons last week the Chancellor of the Exchequer was asked to consider raising revenue by taxing electric lamps according to candle-power, and the Chancellor said that the suggestion would be noted. We hope that the reply merely means that no further action will be taken, for, apart from the fact that there is no reason for singling out electric lamps for this treatment, anything which militates against the raising of the standard of illumination is to be deprecated. As things are at present it is most difficult to persuade people to employ 60-W lamps where they are using inadequate 40-W ones. Any tax of this kind would lead to a rapid reversion to 25-W lamps and to the practice of transferring a single lamp from room to room. "Better light, better Budgets" would be a sorry substitute for the more generally accepted slogan.

Fuel Conservation

ON Tuesday last, in the House of Commons, the Secretary for Mines announced the Government's plans for the rationing of petrol and oil in the event of war. Little was said on this occasion regarding steps to lessen our reliance upon imported fuel. There were references to coal distillation and producer gas for the propulsion of vehicles, but no mention was made of electricity in urban transport—trolley-buses for passengers and electric vehicles for goods delivery. Surely more attention should have been given to these important alternatives to oil-operated transport systems. The installation of a trolley-bus service is, of course, a complicated matter but the replacement of motor delivery vans by "electrics" is more easily accomplished. Electricity supply undertakings would be wise to use this opportunity to advocate such replacements and secure a useful night load.

A Good Example

Too often we have had to reprove borough treasurers (or their Finance Committees) for their scurvy treatment of the Electricity Department and so it is with peculiar pleasure that we record the wisdom of the Barnstaple borough accountant. That sage official prophesied some time ago that price reductions, allied with adequate facilities for the hire and hire-purchase of wiring and apparatus, would lead to rapid expansion of the local electricity undertaking. And so it has turned out—an increase of 38 per cent. in sales having been recorded for the past year. If all municipal financial officers were so far-seeing borough electrical engineers would, perhaps, not shudder so much at the thought of accounts control by the treasurer's department.

Radio by Wire

READERS will remember that shortly after the Postmaster-General's announcement of his Department's intention to commence the distribution of radio programmes over the telephone lines, we published a letter from Capt. P. P. Eckersley in which he stated the case for his method of "re-diffusion" by the use of electricity supply systems. The subject was brought up in the House of Commons this week by Sir M. Sueter, who asked the P.M.G. whether his technical officers were fully investigating the system to ascertain if the technical difficulties could be overcome. Major Tryon replied that the proposal was under consideration in consultation with the Electricity Commissioners, and representatives of the electricity supply associations were being called together to discuss the matter. If there are difficulties and a solution can be found (Capt. Eckersley says that he knows of "no grave technical difficulties yet to be overcome") the power-mains system would be within the reach of many more people of all classes than the proposed telephone-line service. It would also be an added inducement to install electricity.

Earth-leakage Trips

IN his part of the E.C.A. Conference paper Mr. T. C. Gilbert mentioned the early publication of a British Standard Specification for earth-leakage circuit-breakers from which he quoted. The new Specification (No. 842-1939) has now made its appearance with a title indicating that it covers voltage-operated earth-leakage circuit-breakers for use on consumers' premises. It is stressed that:

> "the operation of the circuit-breaker depends on a *voltage* which, existing between the apparatus to be protected and the general mass of earth, is itself dependent not only on the circuit-breaker, but also on the earth electrode resistance; in assessing the performance of the circuit-breaker these two factors must be considered together."

In this connection an appendix is included making some suggestions for reducing earth-electrode resistance where necessary below the maximum figure of 500 ohms. If this cannot be done a special design is recommended. The same appendix refers to the use of water mains for earthing if they are of a "satisfactory nature." If they are so used precautions should be taken to prevent the conduits of the installation touching the water system.

Tin-Bronde Condenser Tubes

GOOD results are reported by the International Tin Research Council from the inclusion of 10 per cent. of tin in bronze condenser tubes. Accelerated tests, have been carried out on the lines developed by the Institute of Metals, corrosion investigations for which are now made by the British Non-Ferrous Metals Research Association (ELECTRICAL REVIEW, July 7th). Sea water was employed, with and without corrosion-fermenting bacteria present, and it is claimed that the tubes in both the jet-infringement and the sediment tests have proved equal or superior to the best at present in use. From particulars we have seen there seems to be no advantage in increasing the tin content above 10 per cent. Tin-bronze tubes are now being tried under service conditions in a condenser in a large generating station, and having regard to their relative cheapness the outcome will be awaited with interest.

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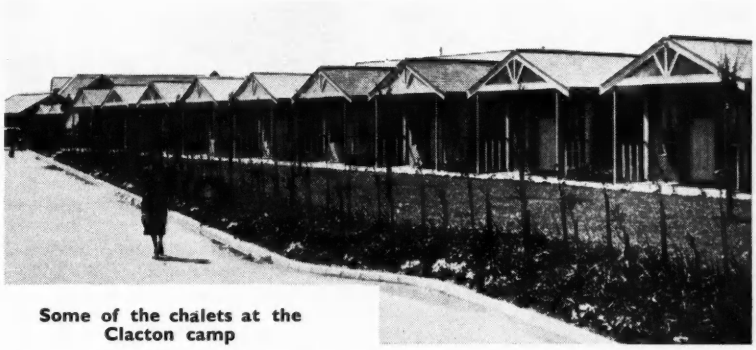
HOLIDAY CAMPS

An Opportunity for Securing Large Lighting and Cooking Loads

IN four years there has grown up at Skegness what is probably the finest luxury holiday camp in Europe, embodying all the amenities and pleasures of a hotel with greater freedom and camaraderie. These camps, under Mr. Butlin's direction, have brought to millions many amenities at reasonable cost, and the brightly painted chalets, concrete paths and well - laid - out gardens give the visitor an impression of gaiety and orderliness.

A new camp was opened last year at Clacton-on-Sea, but the Skegness camp is larger. Indeed, there will be this year a connected load of 1,112 kW. The camp (and adjoining hotel) is supplied by two 11-kV Henley cable feeders forming a ring main at a "Central" sub-station with two outgoing 11-kV feeders to "North" and "South" sub-stations. Four E.C.C. transformers with a total capacity of 1,300 kVA provide the low-voltage bus-bars with a 230/400-V three-phase four-wire supply.



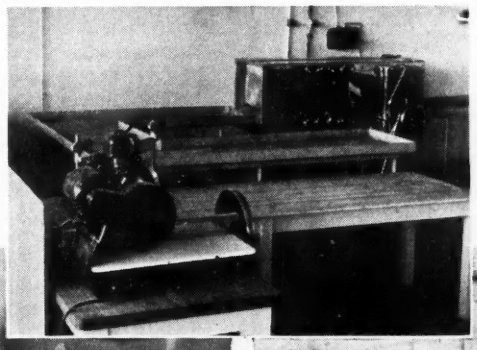
Some of the chalets at the Clacton camp

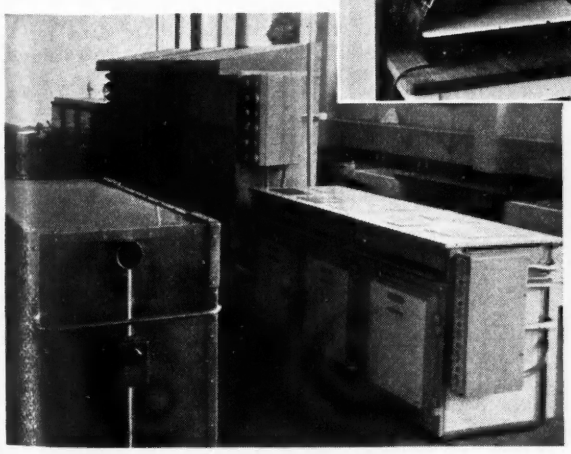
The 11-kV switchgear at the "Central" and "South" sub-stations supplied by W. Lucy & Co., Ltd., has full interlock and isolation features, and incorporates Ferguson Pailin oil circuit-breakers. E.C.C. and Crompton Parkinson oil circuit-breakers are used on the low-voltage side, together with English Electric air-break high-rupturing-capacity switch-fuses. Metering is on the e.h.v. side, the equipment comprising a Hackbridge potential transformer, "Lucy" current transformers and two (main and check) Landis & Gyr combined kWh and m.d. meters. The supply is taken to the distribution points by four-core 0.3 sq. in. Henley cables.

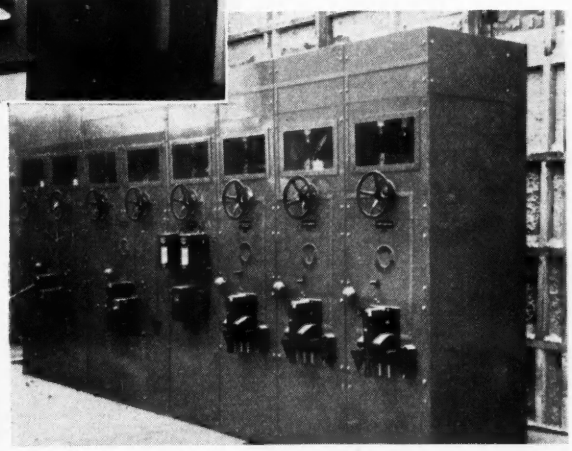
Each of the four dining halls has its own kitchen, and is illuminated by 547 lamps in opal globes representing 25 kW for each hall. The lighting load for the whole camp is now 527 kW. The kitchen equipment comprises four treble-oven Jackson ranges, each rated at 39 kW, and having three 4.8 kW ovens, one 16 in. by 12 in. 5-kW boiling plate and eight 12 in. by 8 in. 2.5-kW enclosed boiling plates. There are two 3-pan fish ranges (24.3 kW each), two 2-pan fish ranges (16.2 kW each), and two 5-pan fish ranges (40.5 kW each), making a total cooking load of 318 kW, in addition to small appliances, such as potato peelers, bread slicers, bacon and meat cutters, refrigerators and five large "Still" 8,000 pieces per hour washing - up machines.

An unusual feature is the 35 Jackson heated trolleys each rated at 2 kW. When the dinner bugle blows the kitchen has suddenly to deal with a demand for up to 4,000 lunches simultaneously, and the only way of obtaining a reasonably speedy service is to have the lunches dished up and served up and kept in the heated and lagged trolleys at a thermostatically controlled temperature of 90 deg. F. Each trolley holds 120 lunches, and is plugged into sockets suspended from the ceiling. Sliding doors make access to the interior of the trolley a simple matter.

A large refrigeration equipment is installed at the camp, comprising a B.T.H. ½-HP water-cooled compressor operating two display counters measuring externally 8 ft. 3 in. long by 2 ft. 2½ in. at top and 2 ft. 9½ in. at the bottom and 3 ft. 1 in. high, and a storage counter with external dimensions of 9 ft. 3 in. by 2 ft. by 3 ft. 7 in. and an internal capacity of 38 cu. ft. There is also a sectional cold-room divided into general food storage, 575 cu. ft. at 40 deg. F., and fish storage, 115 cu. ft. at 33/35 deg. F. A ½-HP motor is used for the general food store and a ¼-HP motor for the fish store. In the general food store there is a conditioned air-evaporator and a







Left and top: Views of one of the kitchens at the Clacton camp, showing the cookers, fish fryers, steaming ovens, bacon cutter and dish washer; (right) 11-kV panel at Central sub-station, Skegness

plate coil in the fish store. The external dimensions are 10 ft. 10 in. by 10 ft. 10 in. by 8 ft. 0 in.

Electric cooking is also employed at the adjoining Butlin's Hotel, where there is a double-oven range (30 kW) and a two-pan fish range (16.2 kW), as well as a large dish-washing equipment.

There are three theatres with a lighting load of 40 kW; two billiard rooms with twelve tables each, accounting for 7 kW; a gymnasium with 3.4 kW of lighting, and two palm lounges with 4 kW connected. Each chalet has a 25-W table standard for each person. For the "chromium" bar there is 2.2 kW of lighting, while eight 100-W lamps are used to floodlight the "old-world" inn known as the "Pig and Whistle." Floodlighting is also employed at the swimming bath, nine 500-W lamps being used, while thirty-three 500-W lamps are used to illuminate the tennis courts and boating lake at night. The clocks in the camp are electric, and that on the central tower, together with the name of the camp, is picked out in neon lighting.

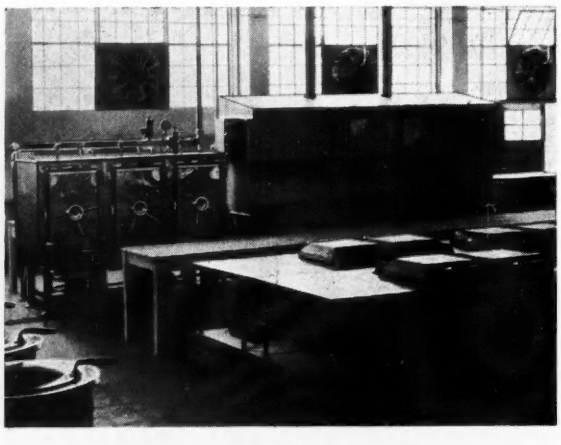
The camp has its own water supply from five bores (two in reserve) 280 ft. deep, the water being pumped by a 3-H.P. motor controlled by a float switch at each bore. A 9-HP motor circulates the water for the swimming pool. The sewage system is also self-contained, the two pumps being driven by 3-HP low-speed motors. At a sewage farm half-a-mile away 15 HP of motor power is installed for pumping purposes.

There are, of course, many smaller uses of electricity, and extensions are constantly being made. This is demonstrated by the increase in the connected load during the past year. Comparative figures show the lighting load to be 527 kW (against 202 kW in 1938); heating, 120 kW (none in 1938); cooking, 350 kW (97 kW); motor power, 114 kW (25 kW); the total installed load is 1,112 kW, as compared with 324 kW in 1938. A high consumption figure can be expected, for 390,245 kWh was used in 1938, as compared with 291,518 kWh in 1937 and 170,149 kWh in 1936. Mr. R. Matthews, district engineer for the Mid-Lincolnshire Electric Supply Co., Ltd., told us that the m.d. in 1938 was 300 kW, but he expected it to approach 1,000 kW this year.

A large refrigerated storage cabinet at the Skegness camp

The Clacton Camp

The new camp at Clacton, which we have already mentioned, caters for 6,000 people at a time, and again



Another view of a kitchen at Clacton

A row of food trolleys used in Butlin's camps

electric cooking is employed. There are two Jackson 7T cookers providing six 4.8-kW ovens, two 16 in. by 12 in. 5-kW boiling plates, and sixteen 12 in. by 8 in. 2.5-kW enclosed plates. The two Jackson five-pan fish fryers have independent control for each pan and represent a total load of 90 kW, while there are also eighteen 2-kW trolleys of the same design as those which are in use at the Skegness camp.

Electrically operated machines are used for bread cutting, bacon and joint slicing, while each kitchen has a complete Still's dishwashing unit capable of dealing with 8,000 pots per hour. Two electric potato peelers of the carborundum type are installed, and four large commercial type Kelvinator refrigerators are used for food storage. One of the most impressive points about this kitchen is its cleanliness. During the summer each part of the kitchen equipment is thoroughly cleaned every night, with the result that it appears like new, while ten large ventilating fans maintain the air in the kitchen free from fumes.

Electricity is employed extensively for lighting throughout the camp. Apart from basic illumination, each of the dining rooms, which measure 360 ft. by 120 ft., are illuminated by a thousand 25-W coloured lamps let in the ceiling, in addition to a set of stage lighting equipment. Ten 500-W floodlights are used for the fountain and bathing pool and twenty-four to illuminate the twelve tennis courts. The total load of the installation is 450 kW, the consumption during the summer quarters of last year being 234,590 kWh.

With regard to the installation layout, the supply was commenced in May, 1937, for the purpose that year of amusements only. It was handled by a 300-kVA kiosk which became overloaded at the beginning of July, thus necessitating the installation of a further kiosk of the same size. Before the commencement of the 1938 season, the new dining and recreation block was built, together with the administration block and chalets. A further kiosk of 300-kVA capacity was installed to supply these, and all three were linked together on the low voltage side through interconnecting mains.

The dining-hall is provided with two 0.15 sq. in. cables direct from one of the kiosks, and the administration block with one 0.15 sq. in. cable, while the amusement park has five 0.1 sq. in. cables running to

METHOD OF HEATING SOIL

Bare Conductors at Low Voltage

By Arthur Brady

SOIL heating can be made safer, more efficient and less expensive by the use of comparatively low voltages applied to bare conductors. The choice of conductor, or resistance, is limited only by the space available, since I^2R=watts expended in heating, no matter what conductor is used. To prove that little difference exists, the following tests were made in an earthenware jar containing two pints of tap water.

In the first case the temperature of the water before switching on was 47 deg. F., raised after 60 minutes to 83 deg. F. The material used was 58 ft. of No. 18 gauge lead-covered wire wound in the form of a spiral coil. The wattage was 32, the temperature rise was 36 deg. F. and the efficiency approximately 82 per cent.

In the second case the initial temperature of the water was 48 deg. F., raised after 60 minutes to 83.2 deg. F. The material used was 13.4 ft. of No. 17 iron wire. The wattage was 32, the temperature rise was 35.2 deg. F. and the efficiency approximately 82 per cent.

Cable makers manufacturing soil-heating cables to work at commercial voltages vary their methods of manufacture to ensure a safely insulated job. They know that to make a cheap job will tend to create faults that become a source of trouble and potential danger; hence the expensiveness of this class of cable and, also, unless specified for the job, a system of water-tight junction boxes becomes necessary, the installation of which requires highly skilled labour.

A system of bare conductors becomes possible by stepping the voltage down to a value low enough to avoid appreciable leakage to earth. This is readily achieved by means of a transformer whose efficiency can be designed to be a substantial figure and whose mobility can be ensured by limiting the size to fairly comfortable dimensions.

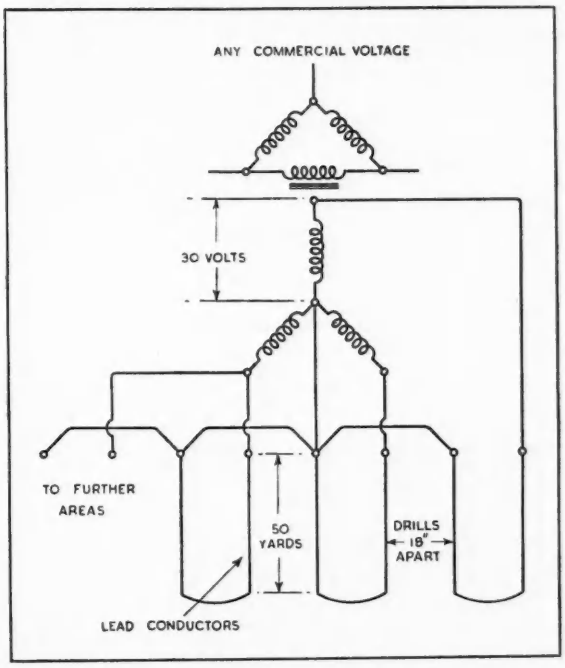
The advantages of using lead-covered wire as the conductor are many, chief among them being its resistivity to soil and general weather deteriorative conditions and to being almost worth its initial value if resold as scrap. Also, it is practically springles and forms into shapes readily, as well as being easily jointed; it can also be heated within a few degrees of its melting point without losing efficiency.

The question of initial expense now arises. This, of course, will depend on several factors, but it will be quite obvious that a bare conductor will be cheaper than an insulated one.

A possible method of heating an acre field can now be described. If, say, a No. 8 gauge lead-covered wire having a resistance of 0.008 ohm per yard had 30 V applied to it, then the current that would pass through a 100-yd. length would be $\frac{30}{0.8}$=37.5 A. The heat produced per square yard depends on the number of lines laid down. If, for instance, they were spaced 18 in. apart the heat dissipated per square yard would be $2(0.008 \times 37.5^2)$=22.5 W. This in a field of one acre would represent a total loading of $\frac{4840 \times 22.5}{1{,}000}$=109 kW.

As an example, say the field happened to be roughly 100 yd. by 50 yd. If a three-phase supply were laid down the installation could be arranged as indicated in the diagram, so that the expenditure of 22.5 W per square yard would cause a temperature rise over the surrounding soil, the figures being taken from data obtained under actual test conditions.

The temperatures of the soil (one square yard) for 100 W in deg. F. when observed after inserting the thermometer to



Soil heating arrangement

a depth of 3 in. and removed at equidistant positions from the heating elements were :—

After 4 hours	44 deg. (unheated)	54 deg. (heated)	10 deg. (diff.)
,, 10 ,, ...	43 ,, ,,	62 ,, ,,	19 ,, ,,
,, 18 ,, ...	38 ,, ,,	55 ,, ,,	17 ,, ,,
,, 24 ,, ...	44 ,, ,,	68 ,, ,,	24 ,, ,,

It follows, then, that 22.5 W per sq. yard should heat up the soil as below :—

After 4 hours	$\frac{22.5}{100}$ (54–44)	= 2.25 deg.
,, 10 ,, ...	$\frac{22.5}{100}$ (62–43)	= 4.275 deg.
,, 18 ,, ...	$\frac{22.5}{100}$ (55–38)	= 3.825 deg.
,, 24 ,, ...	$\frac{22.5}{100}$ (68–44)	= 5.4 deg.

Resistance of wire per phase, 0.8 ohm. Voltage, 30. Amperes, 37.5. Watts per phase wire, 1.125.

Holiday Camps (*Concluded from previous page*)

various points. During last winter a new dance hall was added, and a 0.1 sq. in. cable has been laid. The châlets are supplied by services which are taken from two 0.1 sq. in. cables running through each end of the camp. All cables are four-core.

The total annual consumption for the first year was in the neighbourhood of 170,000 kWh and over 300,000 kWh for last year, and it is anticipated that these figures will be exceeded this year.

The supply is delivered to the camp at 11,000 V, three-phase. The whole installation was planned and drawings showing the various circuits were prepared by the Clacton Electricity Department, and the underground cables were of the Telegraph Construction & Maintenance Co.'s manufacture, while those used for the inside work were supplied by W. T. Henley's Telegraph Works Co. Switches and fuses made by the Midland Electric Manufacturing Co., Ltd., were used, and the whole of the switchgear was erected on angle-iron frames and assembled by the Electricity Department.

Both the dining block and administration block have neon signs, each taking over 30 kW. These signs are among the largest in the country.

The success of the camps can be judged from the rapidity with which extensions are proving necessary, while a new camp to house 8,000 people is being constructed near Scarborough. Electric cooking has proved so successful that it will again be used. There are, of course, many small camps other than Butlin's where electricity could be used to greater or lesser degree. Much depends upon the tariff which the supply authority can grant, upon the progressiveness of its policy and the outlook of the camp's proprietor, but there is no doubt an opening to increase the consumption of electricity very substantially.

I.E.E. Regulations—II

MAIN SWITCHGEAR

By H. R. Taunton, A.M.I.E.E.

WITH a slight omission and a slight addition (in the note), Rule 101 in the new "Regulations for the Electrical Equipment of Buildings" issued by the Institution of Electrical Engineers is the same as in the tenth edition. The diagram, too—our one and only diagram, not counting that in Appendix 3—remains the same, except for the momentous alteration of FS to SF in (ii) and (iv). That, and similar alterations in following rules—"fuses" for "cut-out" and so on—follow the "amended" definitions to which allusion was made in the first article (ELECTRICAL REVIEW, July 21st, page 79) and where they are the only alterations in the wording of a previous rule they can, for our present purposes, be ignored.

With that proviso we can pass on to Rule 105, to which has been added a new note, recommending in certain cases the omission of the consumer's main fuses, and the limiting in capacity of his sub-fuses. If this is referred to the diagram under Rule 101, the effect is to cut out items (ii) and (iv) and the F's in the two other items. Connection is then to be made direct from the S's to controlling dis-boards, of which no way should exceed in capacity one-third of the total amperage of the installation. That, of course, is not always possible: for instance, where a cooker forms the bulk of a domestic load. Where it can be followed, the recommendation (which includes the provision of quick-acting fuses where their capacity is greater than 15 A) is a good one, reducing the chance of a local fault jumping the consumer's sub-fuses and blowing the supply authority's main fuses.

Difficult Reading

To the ordinary reader, not privy to its compiler's thought-processes, Rule 106, as worded in this edition, is a baffling essay in the centrifugal idiom. It goes round and round, and and always further from its point. Let us therefore restate it in a somewhat condensed form and see if we can make anything of it.

> 106. In an installation controlled by a splitter unit the consumer's main fuses may be omitted, subject to clauses A and B, which are themselves subject to clause C, by which, if the consent of the supply authority has been obtained to such omission, clauses A and B do not apply. In other words, they apply only if the consumer's main fuses are omitted without the consent of the supply authority, by a breach of Rule 105.

That is a fair—indeed, the only possible—rendering of the rule and its first three sub-clauses, but obviously it is not the rendering intended. Far be it from me to hazard a guess at what that was, but on the face of it it would have been better to have left the old rule as it was, more particularly as no attempt has been made to remove its chief fault which is that, by implication, it limits the use of splitter units to mixed lighting and heating installations. For no discernible reason neither the tenth nor the eleventh edition wording of this rule allows a lighting load of, say, 10 A to be controlled by a two-way or three-way splitter.

The old Rule 107, which was in effect no more than a reference to the appropriate B.S.S., has been omitted, as have several similar rules of the old code, a sensible saving of space, in both senses of "sensible."

In the new Rule 109, clause C of the old rule (110) has been omitted, and the wording of the new clause C has been modified. This removes a discrepancy to which I called attention in reviewing the last edition.

In Rule 110, providing for the protection of all circuits and sub-circuits, an exception has been made of branches "derived from a cooker control unit," e.g., the socket connection commonly fitted for the purpose of attaching an electric kettle.

Altered Numbering

The numbering of the rules in the eleventh edition is now out of step with that of the tenth. To avoid confusion, or a repeated identification of the old numbers, in this and following articles, it is to be understood that any number quoted without qualification refers to a rule in the new edition, or to the corresponding rule in the old, if any, whatever its number may have been.

It is rather disconcerting to men accustomed to use the I.E.E. Regulations freely in their professional work, and who, after five or six years, get the numbers of certain rules stamped on their memories, to be obliged to learn new numbers for them. There is a definite inconvenience which might at times cause a misunderstanding, in having to relabel, for instance, so important a rule as the old 112, the familiar "all switches on the red" rule, now to be known as 111.

A suggestion worth consideration for the next edition would be to make all numbering permanent. The numbers of old rules omitted could be noted in italics in the margin. New rules could be added at the end of each section, or, if their subject made it necessary to interpolate them, they could be labelled by some modification of the preceding serial number, such as 111A or—to avoid clashing with the present system of distinguishing clauses—111/1; and so on.

"Non-linked" Switches

After that digression we return to our review, and observe that the note to Rule 111 is not that of the tenth edition but that given in the amendments issued later, in June, 1935, except that the awkward "non-linked single-pole" (switch or circuit-breaker) has been shortened to "single-pole." This meets a criticism made at the time, but curiously enough the old term "non-linked" has been retained in the following rules, 112 and 113. Its use there is perhaps more understandable, but the average wireman, accustomed to think only of single-pole or multi-pole switches, will have but a hazy idea of the meaning of these rules, unless he looks up the definition of "Switches, Linked"—after failing to find one of "Non-linked Switch."

Rule 112 has been amended and the note amplified in conformity with the fuller and more precise definition of earthing practice to be found throughout this edition.

Rule 115, providing that single-pole switches shall not be fitted on the neutral or earthed conductor, is a new one, and unnecessary. A slight modification of Rule 113 would have covered it. For the matter of that, both 113 and 115 could have been covered by the addition of a few words to the more general Rule 111, or to its note, more particularly as we have almost the same rule repeated later in 207 and 410, to say nothing of 1204. It is, to be sure, an important rule, and perhaps the compilers had in mind the dictum of the Bellman in "The Hunting of the Snark": "What I tell you three times is true."

The old Rule 116, the long and clumsy dissertation on earth-leakage trips, has been deleted. Its matter is dealt with later, in much improved detail, in Rule 1006, corresponding to the old Rule 1005. The rest of Section 1 in the new edition, two rules occupying nearly two pages, is practically all new and all important.

Cables and Fuses

Clause A of Rule 116 should be compared with clause A of Rule 202, which practically repeats it, with slight adaptations to circuits of less than 15 A. So far as circuits greater than 15 A are concerned, the only rule in the tenth edition comparable with 116A, which limits the size of a cable by that of its protecting fuse, is 615, which limited the size of the fuse by that of the cable—which seems the more sensible course, since cables, which are practically fixtures, come first in any scheme, while fuses, easily alterable, generally come last.

Clause B of Rule 116 is new in so far as there was, curiously enough, no definite rule in the tenth edition stipulating that a reduction in the cross-section of a conductor should be locally protected by a fuse or circuit-breaker, though there are several that imply it.

Clause C, a long one, deals with the precautions to be taken where it is impracticable, as it often is in trough or duct systems, to protect a tapping at the point where it is taken off the mains. Some of it, as for instance sub-clause (iv), is to be found in substance in older rules, but as a whole Rule 116 is original, obviously intended to meet developments in the use, for risers and large power distribution, of bare conductors and similar systems. (It is interesting to old-timers to see the once-condemned "tree" system coming again into fashion, if only for mains.)

The common sense of Rule 117, though it has long been the practice of responsible contractors, has not previously been embodied in the code. The only rule comparable with it in the tenth edition is 616, but this does not refer to main switchgear, as does the new rule, or at the most only indefinitely.

RESEARCH AND RESULTS

By H. Warren, M.I.E.E.

To illustrate the practical results of research the author refers to the work of the laboratory with which he is associated and mentions characteristic advances in insulations, electric lamps and talking films

PRIMARILY, research is conducted to acquire knowledge; it always achieves this objective, though the particular knowledge found is often not that which was sought. Expected or unexpected knowledge may turn out to be mainly of academic or of practical interest and if it is of the latter class it is popularly hailed as a " result " of research.

There are many important industrial research laboratories in this country, particularly in the electrical industry, which are not only well staffed and generously equipped, but which have also the advantage of co-operating with well-established and organised research associations which manage and conduct researches of common interest. Our industry is particularly fortunate, for the British Electrical and Allied Industries Research Association is most active, efficient and useful.

Insulations

In regard to insulations, perhaps the most spectacular progress has been the development of synthetic materials, which really started from the pioneer academic work of Baekeland round about 1908. The general realisation of the potentiality of his alkaline catalysed phenol-formaldehyde products prepared under heat and pressure was the foundation upon which a vast range of excellent synthetic products has since been built up.

Prior to this, the bonding media in common use were shellac, gums and bitumens, often combined with drying oils. The resulting products usually had low softening points, inferior mechanical strength and often poor finish. Resistance to high temperature was commonly imparted by tedious oven curing, accompanied often by dimensional and surface changes.

Following the introduction of the heat-hardening type of phenol-formaldehyde resins their use has increased to a phenomenal extent, not only for bonding laminations together but also in the numerous grades of moulding powders now available. For this purpose many other synthetic resins are now employed, including urea-formaldehyde and Glyptal products. Rods, tubes, sheets, wrappings and mouldings are included, and new performance conditions have been made possible and safe, resulting in machines for services that could not otherwise be met. The materials are good electrically, mechanically, thermally and dimensionally; they can have excellent finish and are cheap. They represent research results of far-reaching importance.

Quite recently synthetic moulding compounds have been developed, practically retaining the engineering attractiveness of phenol-formaldehyde compositions, but having the added advantage of immunity from surface carbonisation.

Turning now to the base materials that may be bonded by the new resins, there are papers, fabrics and wood; these being of an organic nature deteriorate and become brittle at temperatures above 120 deg. C. The only fabric or flexible sheet material of an inorganic nature available has hitherto been asbestos, the improvement of whose mechanical and electrical properties has always been desirable. Despite these difficulties, however, excellent products have been available, but they have involved continuously careful purification and manufacture.

Woven Glass

During the last year considerable progress has been made, abroad and in this country, in the production of woven materials from fine glass threads. It is now possible to obtain glass fabrics and sleevings, and glass fibres can be applied to wires in much the same way as silk and cotton are now used. The woven-glass products resist high temperatures without appreciable deterioration in mechanical strength; they are, however, rather weak in shear, and impregnation is necessary if they are to withstand successfully the stresses of application. Consequently, it is necessary to consider the development of special heat-resisting varnishes, and here again research will provide the desired result.

It may be that polymerisable resinous compounds of silicon, such as methyl silicone, which is thermally stable at temperatures up to about 250 deg. C., will prove to be of use in conjunction with woven glass, and also in the preparation of composite insulations to withstand such temperatures.

New types of synthetic enamel for wire insulation are now available, rendering practicable the consideration of dispensing with cotton or silk mechanically protective outer coverings. These new synthetic wire enamels have also increased resistance to varnish and solvent attack. Coils may now be impregnated with a synthetic resin material filling the interstices with solid insulation, and eliminating the voids ordinarily experienced with varnish impregnations.

Most of this, and much additional progress, has resulted from the appreciation of the importance of the study of chemical synthesis. So far as my company's laboratory is concerned it started the synthesis of experimental products in glass flasks more than twenty years ago, and since then thousands of tons of synthetic products have been produced in the company's digestors and mills.

Mr. Warren is director of research with the British Thomson-Houston Co., Ltd.

Electric Lamps

In the electrical production of light two methods were first devised—the electric arc discovered by Davy in 1801 and the incandescence of a conductor discovered by De la Rue in 1820. As is not uncommon in the history of discovery, there was the knowledge of means for achieving a required objective long before other conditions allowed practical application.

No cheap electrical power was available, and it required the discovery of electro-magnetic induction by Faraday in 1831 to open the way for the development of electric power generation. Following this, lamp research was intensified and organised, and there commenced the long struggle for supremacy between the arc and the incandescent filament.

The arc, as discovered, was almost in a practical form, and rapidly became the acknowledged high-power electrical illuminant. The early development consisted largely of evolving satisfactory stabilising and carbon-feeding equipment.

The development of the incandescent lamp required the help of other researches, for example, the discovery of the mercury vacuum pump by Geissler in 1862 and the devising of vacuum technique by Crookes in 1875 during the making of his radiometer. This knowledge was seized upon by Swan, who outgassed his incandescent filaments during exhaust, and finally there came the Edison patent summarising the details necessary for the practical lamp, namely, the use of a long thin filament operable from supply mains, and the enclosing of the filament in an evacuated bulb through which electrical leads were sealed. With these fundamentals established, the incandescent electric lamp took its place as the recognised low-power electrical illuminant.

Further detail investigations in the development of tungsten filaments and gas-fillings in the incandescent lamp, and the introduction of a low-pressure gas-filling in the enclosed arc and the use of luminous flame arcs, improved the efficiency of both types of lamp.

A few years ago the incandescent lamp had taken over almost all low-power installations, and had even replaced the arc generally for lamps up to 20,000 lumens in output, while the arc lamp was used for high-power and projection work.

Discharge Lamps

Then began the development of the modern electric-discharge lamp. This development can be regarded as the application to the arc lamp of the evacuation technique so vital for the success of the incandescent filament lamp. Again other developments were necessary before much progress could be made. It is true that discharge lamps were made in 1890 by Moore, and that the Cooper-Hewitt mercury-vapour lamp was constructed in 1901, but it was the incidence of the thermionic electrode of the thermionic valve that made possible efficient mains-operated discharge lamps about seven years ago.

Two lamps were then introduced, with light emitted from arcs in sodium and mercury vapours. The development of these lamps followed similar lines, although the operating conditions are so diverse. The sodium lamp was in a sense a development from the flame arc, in which a sodium core had been found to introduce an orange colour with a marked increase of efficiency.

On investigation, the orange light proved to be the resonance radiation of sodium. This was found to be excited most efficiently by low electric currents with the vapour at a temperature of 300 deg. C. To achieve such conditions a starting gas had to be used, and neon was found to be best suited. To obtain the necessary temperature with the minimum power a vacuum flask had to be placed around the inner arc tube.

Special Glasses

One of the most important developments was the glass for this inner arc tube. Sodium at 300 deg. C. is violently chemically active, and the glass technologists did well to provide a glass resistant to this attack. This glass, however, is mechanically weak, and in practice is "flashed" on to a second glass having an expansion coefficient suitable both for the surface of sodium glass and for the making of satisfactory seals with the metal electrode leads.

The modern mercury-discharge lamp followed an investigation of the mercury-vapour arc radiation at high pressures. It was found that increased luminous efficiency could be obtained, but again before this could be utilised the glass technologist had to produce a suitable glass. To obtain mercury vapour at a pressure of one atmosphere a bulb temperature of approximately 500 deg. C. was necessary. Thus the glass had to be suitable for working at this temperature and for fusing to metal electrode leads. Such glasses were obtained and the lamp was thus made possible. A starting gas was necessary to build up the discharge, and an outer jacket tube was found to be desirable.

The rapidity of the development of these lamps has been made possible by the increased industrial research facilities of to-day, such as by the improved scientific equipment available, particularly the spectographs, X-ray crystal analysers and modern electrical measuring instruments.

The first practical discharge lamps invaded the sphere of the medium-power incandescent and arc lamps, used largely for street and industrial lighting. Recent research had evolved experimental high brightness, high-power mercury arcs using quartz arc tubes. These lamps are competing in the projector lamp field, and may develop for the high-power work once regarded exclusively as the field of the arc lamp.

The commercial success of discharge lamps is due to their high luminous efficiency, their simplicity and durability. Their universal utilisation is impeded by their colour peculiarities, but further research is annulling the domination of their present colour characteristics. In these lamps use is being made of the resonance radiation of mercury. This radiation lies in the invisible ultra-violet region of the spectrum, and by means of fluorescent materials it can be converted into visible light of more acceptable colour.

The work of bridging the gulf between the idea of an electric lamp and the practical lamp is illustrative of much of the present organised commercial research. To-day this country leads the world in its discharge-lamp lighting of roads.

Talking Films

The technical development of our major entertainment industry provides another story of the results of continuous industrial research born of the co-ordinated achievements of workers in a wide variety of scientific fields. Electrical and mechanical engineering, vacuum physics, radio, chemistry, photography, optics, all combine in the remarkable progress of the last ten years.

The historical background commences with the camera obscura in the eleventh century. In the fifteenth century came the discovery of the blackening of silver salts by light and then, rather more than a hundred years ago, was noticed the phenomenon of persistence of vision. Following this fundamental discovery many attempts were made to photograph consecutive pictures of animate objects. The pioneers worked under great limitations, however, until the production of the continuous film by George Eastman in 1884.

Then came a rapid development of motion picture cameras and projectors by Robert W. Paul, Lumiere, Gaumont and others. At the same time Edison was working on his phonograph, and many attempts were made to combine the two. The necessity for a projector at the rear of the hall and the phonograph alongside the screen made the difficulty of synchronisation at that time well-nigh insuperable. It fell to Sir Ambrose Fleming, with his invention of the thermionic valve many years later, to provide the missing link. Then followed the electrical production of gramophone records, and the talking-film in its simplest form was a comparatively easy step.

This synchronised disc method had serious disadvantages, and many attempts were made to record the sound on the edge of the picture film. The most outstanding experimenter was Eugene Lauste, who patented both "variable area" and "variable density" methods of photographically recorded sound, but these patents were obsolete before financial backing was available to promote commercial development.

The real commercial development of the sound-film dates from 1928, when the then prosperous silent-film industry invested sufficient capital to enable its engineers to co-ordinate the previous experimental work into the first practical synchronised sound-on-disc accompaniment. For a few months there was common scepticism, and then almost suddenly a new industry was born. Every cinema in the Western world needed the new equipment within a year.

The problem at first sight seemed comparatively simple, and a number of concerns commenced to market synchronised-disc equipments. A few of the large electrical engineering groups (notably the Western Electric and R.C.A. in America and the B.T.H. Co. in this country) had been working quietly in their research laboratories for some years and had realised the magnitude of the problem. A short experience with the synchronised discs with their bulk, short life, expense and possibility of operational error had shown that Lauste had been right in his conception of a photographic sound record "married" to its picture, and by 1931 the method was almost universal.

Distortion Troubles

In the early equipments of 1928-30 the reproduction was marred by frequency and amplitude distortion, and by the acoustic properties of the cinemas. The difficulty of maintaining a recording power range of 30 db. on the film led to serious deformation of the character of the recorded sound. Distortion introduced by the film-propelling mechanism took the form of gearwheel and sprocket tooth ripple, which modulated the sound record and produced harsh reproduction.

The need for acoustic treatment of the halls was recognised from the first, but little was known of the absorption properties of the materials available or of the measurement of reverberation and of its optimum value for a given auditorium. It became the practice to treat the walls with sufficient material to bring the reverberation time of a 500-cycle note to somewhere between 1¼ and 1½ sec., depending upon the size of the hall. The reverberation periods of notes of higher or lower frequency were ignored, and the usual result was that reverberation was too high at low frequencies and too low at high frequencies. This gave accentuated bass response and a hard "dead" response to the higher frequencies.

The screen image exhibited considerable transverse and vertical unsteadiness; there was disturbing flicker and the illumination was low. With particular regard to the picture, the necessity for constant velocity of film propulsion in the sound reproducer led to a complete investigation of the major defect of the nitro-cellulose base, *viz.*, shrinkage. From this came accurate design of film sprockets and accumulated knowledge of the design of film paths and control surfaces in the mechanism.

Screen illumination has been continuously increased, despite the fact that the wattage of the light source has been decreased. Improved optical and mechanical design of the projection lantern, together with the co-ordination of carbons and rectifier equipment, has increased the screen illumination from 2,000 to 7,000 lumens, with an improvement of efficiency from 0.2 to 0.8 lumens per watt. A knowledge of the relation of screen-illuminated wave-shape to eye-strain and the methods of its control has allowed this increase of screen brightness with less apparent "flicker." The increased fire risk due to gate heating with these high values of illumination has been met by intense study of the problem and resultant improved mechanical design.

Visual Contrast Studies

Work continuing at the present time concerns the investigation of visual contrast between the screen image and its surround, and this shows promise of alleviating the apparent apathy for colour films by removing a generally unrealised source of discomfort. The application of the gaseous discharge lamp for cinematograph projection with its promise of improved efficiency and operational advantages is also being actively pursued.

As regards sound reproduction, the photographic limitation to the frequency range is the lack of resolving power of the emulsion. Light falling on the silver-halide particles during the recording is scattered, and exposes other neighbouring particles. Thus instead of a well-defined change of contour

from black to white, the boundary of the sound wave has a density gradient. This light scatter becomes serious at high frequencies and produces a loss of output and the introduction of spurious harmonics in the case of variable-area recording.

These difficulties have been overcome by work in the United States and in this country in part by improved photographic emulsion, but more particularly by developments in the sound recorder and reproducer. These include the introduction of bi-lateral tracks, the use of monochromatic short wavelength exposure to assist resolution, push-pull recording where harmonic distortion is electrically cancelled, and the principle of " non-slip " printing.

One of the earliest improvements introduced was ground-noise elimination. The background noise from a film is due to accidental variations in film transmission over extremely small areas and to shot effect in the photo-cell. If the track transmission is made proportional to the recorded amplitude the background noise is reduced to the lowest possible value, and the volume range increased accordingly. To achieve this the clear part of the sound track is reduced to a minimum. Ground-noise elimination has been effected in various ways for the different types of track, and has resulted in an increase in volume range of 10 to 15 db.

In the reproducing " sound head " the accuracy of form of the scanning slit has been improved by optical correction which co-ordinates the overlapping spectral sensitivity of exciter lamp and photo-cell by allowing the depth of focus of the objective to accept the mechanical tolerance of the film movement, and by optical design which avoids uneven slit-image illumination and maintains a constant illuminated area on the cathode of the photo-cell.

Constant velocity of film travel has been improved steadily by skilful application of the principles of mechanical filtering. The present standard is illustrated in the " rotary magnetic " sound head.

The trend of amplifier design has been towards a wider frequency range, a, reduction in background noise with a corresponding increase in available power range, and a reduction in harmonic content. A frequency range flat between 50 and 8,000 cycles per second is found to be satisfactory at the present stage of the art, although there is no difficulty in considerably extending this range in either direction.

One of the most interesting of recent developments is the extension of the power range by a volume-expansion circuit so arranged that small input signals are amplified less than large input signals. The result is an automatic extension of the volume range of some 10 to 15 db.

Research work on loud speaker design, commencing with increase of frequency range, has included auditorium distribution, " intimacy," non-linear distortion, acoustic efficiency, and transient response. The present state of the art is illustrated by the twin-speaker combination employing large moving-coil units in 10ft. semi-directional baffles covering a frequency range of 30 to 500 cycles in combination with small multi-cell exponential units to continue the range to 8,000 cycles.

The final operation of the sound-reproducing equipment is inseparable from the acoustics of the auditorium, and here research has again covered a very wide field. Architectural design has been much modified from the rectangular box form of early cinemas, and interior treatment is now designed to absorb equally over the whole audio spectrum and to reduce the reverberation period to the optimum for given cubic capacity.

The character of the work which is being conducted in this direction can be illustrated by the overall-performance calibrating equipment which is being used to give a continuous cathode-ray-tube trace of the characteristic at any point in the auditorium, as heard by a calibrated microphone, when the screen loud speakers are excited by a sweeping frequency trace. A companion high-speed level recorder plots the reverberation period at any point in the audio range. The equipment developed by the laboratory with which I am connected is at present reproducing talking films literally to millions of cinema patrons each day.

I desire to acknowledge the assistance of my colleagues, Messrs. Newbound, Ruff and Eade in collecting much of the information included in the foregoing.

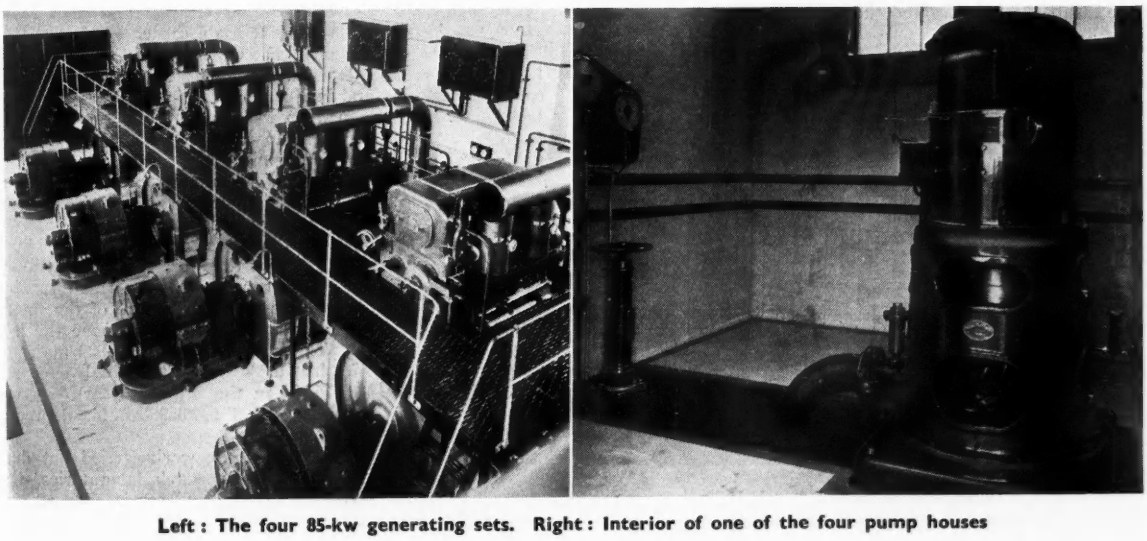
Electric Pumping Plant

A PUMPING plant was inaugurated at Dunton on July 4th by Lord Luke of Pavenham for the Biggleswade Water Board. The pumps will be driven by electric motors instead of oil engines as at the older wells. The power plant consists of four two-cylinder 127-BHP, 275-RPM vertical heavy-oil engines of the airless injection type coupled to 85-kW 440-V DC generators.

Fuel oil is stored in two 30-ton tanks; purification is effected by two 60-gal. per hr. De Laval centrifugal filters with motor-driven pumps and a 3-kW heater. Lubricating oil from the sump (¾ to 1 gal. per hr) is continuously purified by " Streamline " filters with coil heaters fitted to the exhaust manifold. A boiler for warming the engine room is inserted in the exhaust by-pass which leads to a Burgess silencer. A seven-panel switchboard controls the four generators, bore-hole pump motors and station auxiliaries. Adjacent to it are panels on which are mounted indicating and recording instruments and Venturi meters (by Geo. Kent, Ltd.), contactors with start and stop push-buttons for controlling the bore-hole pumps, shunt regulators for giving motor speeds of from 1,350 to 1,520 RPM, and interlocks for stopping the motors automatically on a failure of the water supply to the shaft and pump bearings. For lighting the pump-house and adjacent cottages there is a 2½-kW 110-V DC generator, driven by an auxiliary oil engine.

In each of the four 14-in. diameter bore-holes is installed a centrifugal pump delivering water from 140 ft. below surface against a total head of 404 ft.; two units, driven by 62-HP vertical drip-proof motors, deal with 18,000 gal. per hr. each, and two driven by 50-HP motors deal with 14,400 gal.

Normally two engines run in parallel to supply two large and one small pumps, and under these conditions the fuel consumption is 0.712 lb. per water h.p. per hr. The engineers for the scheme were Messrs. Binnie, Deacon & Gourley. Mr. T. A. Stainforth, engineer to the Biggleswade Water Board, and Mr. P. S. Morton supervised the contracts. The whole of the generating and pumping plant, including switchboard, motors and controllers, was manufactured by W. H. Allen, Sons & Co., Ltd.



Left: The four 85-kw generating sets. Right: Interior of one of the four pump houses

PROGRESS IN ONTARIO

Hydro-electric Power Commission Report

THE outstanding event in the operation of the Ontario Hydro-Electric Power Commission's system during the fiscal year ended October 31st last, for which the annual report has just been issued, was the ice jam on the Niagara River on January 26th. This resulted in the Ontario power plant being put out of action completely and, owing to the high tailwater, the output of the Queenston plant was also curtailed. Otherwise the operating conditions on the Commission's systems were satisfactory.

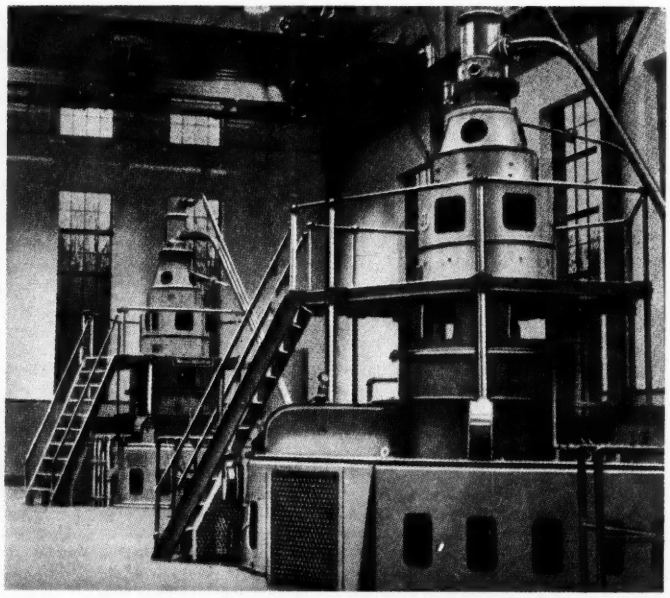
On the Niagara System, despite the loss of the Ontario station, full delivery of primary power was maintained to all private consumers, and to supplement the output of the power plants on the Georgian Bay System, power was transferred from the Niagara System and purchased from the Water, Light and Power Commission of Orillia. With the completion of the Ragged Rapids plant, one unit of which was put into service last October, it is thought that the necessary assistance from outside sources can be supplied by the Niagara System through the Hanover frequency changer set for some time.

On the Thunder Bay System, due to the exceptional demands by the grain trade, the highest primary demand for power on record was experienced during September. A fourth transformer bank was added at the Abitibi Canyon generating station in March, permitting the concurrent operation of four of the five 60,000-HP generators. The storage dam to control Frederick House and Night Hawk lakes was completed in time to impound the 1938 spring run-off, and acquisition of the Crystal Falls station in 1937 relieved the power situation in the Sudbury and Nipissing districts.

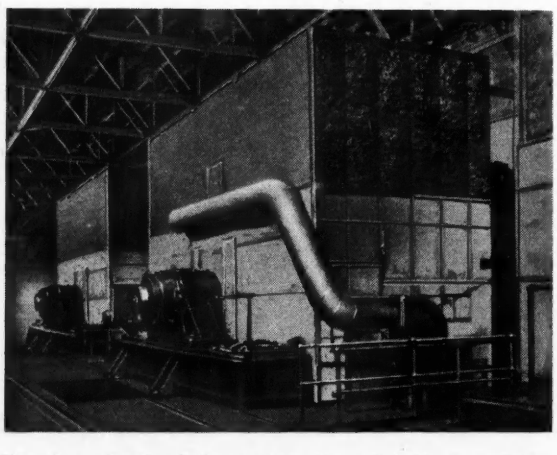
When the flood at the Ontario plant subsided it left behind about 7,000 tons of ice and a heavy deposit of oil over everything. Rehabilitation of the plant was an undertaking of considerable difficulty. In 1909 attempts to dry large generators similarly flooded proved unsuccessful and those who had had experience of other flooded stations were of the opinion that the large generators could not be dried out successfully. However, with the aid of new methods and apparatus the units were successfully recovered and again put into operation. Eight days were required to move in materials and supplies to effect clearance of the station. Mechanical shovels and trucks, working for 32 days, removed the 14,250 cu. ft. of ice in the power house and the work of final cleaning took a long time as the water had floated between 15,000 and 20,000 gallons of oil from the transformers into the power station, covering all exposed surfaces.

The main units were dried out by constructing an insulated housing round them and forcing air heated to about 120 deg. C. through the machines at high velocity. The dry-out was started with the machine at rest, and continued for about 12 to 14 days in order to dry the field coils sufficiently to enable the insulation to withstand the crushing effect of centrifugal force when the fields were rotated. The machines were then run at reduced speed until the insulation resistance on the fields reached 200,000 ohms. This required about eighteen days, after which they were put on short-circuit up to full-load current to maintain a temperature of 85 deg. C. in the windings, with hot air and internal heating. Six to seven weeks' operation on short-circuit was required for complete dry-out, or a total period of 10 to 12 weeks per unit.

In this final period it was found necessary to run the machines through five or more cycles of cooling and reheating to provide a temperature gradient between the inside and outside of the armature coil insulation which would facilitate the movement of any moisture trapped in the coil. The use of vacuum tanks proved very successful in drying out motors of all voltages up to 2,200 and up to 250 HP, service transformers of 12,000 V, auto-starters, &c., in from 24 to 48 hours.



The two 4,500-kVA generators at the new Ragged Rapids plant with 70-kW direct-coupled exciters



The hot air circulating system for rehabilitation of the Ontario plant

The general upward trend of primary loads flattened out in 1937, the increase during 1938 being 1.7 per cent. That, however, for the mining districts served by the Northern Ontario Properties went up by 26 per cent., while the peak of the demand for rural power in August was 15 per cent. higher than the previous year.

The Ragged Rapids development on the Musquash River came into service in October. It has a capacity of 10,000 HP. There are two generating units. On the Wanapitei River the timber dam on the Coniston development was replaced by a concrete structure, and in Northern Ontario a large dam fourteen miles below Connaught was brought into service to restore the level of Frederick House Lake. This increases the capacity of the Abitibi development by 40,000 HP.

With regard to transmission, a total of more than 135 route miles was constructed of which eight miles was for operation at 110,000 V. The rural primary lines approved for construction amounted to about 2,660 miles to serve more than 14,000 additional customers. At present there are about 15,800 miles of rural lines serving 100,000 consumers. The small surplus in relation to total income has been the feature of the financial statistics for many years, and this is again none the less true for the past year. The income was $33,981,832 (as compared with $34,165,476 for 1936-7) and the total expenses were $30,484,934 ($30,375,793 in the previous year). From the surplus is deducted $2,451,529 ($2,329,625) for depreciation reserves, &c.

The report gives particulars of the work carried out during the year by the testing and research laboratories, the approvals laboratory, the production and service department and the electrical inspection department.

Organisations of the Industry—XVII

British Standards Institution

By C. Le Maistre, C.B.E., F.C.G.I., Director

THE national movement for industrial standardisation commenced in this country in 1901 with the setting up of a small committee of eight prominent engineers to standardise steel sections, and at the same time to reduce the tremendous variety of sizes which had to be kept in stock involving a large amount of unremunerative capital. It has now developed into an organisation consisting of about one thousand committees (technical committees, sub-committees and panels) with an aggregate membership of over 18,000.

One of the first electrical subjects to be studied was the question of defining the rating of an electric motor and a sub-committee, of which Colonel R. E. Crompton, F.R.S. was the chairman, was formed to investigate the possibilities of general agreement on a solution of the problem. There was considerable confusion at that time as to how the rating should be defined, and there was, moreover, no means of ascertaining the views of industry other than by a questionnaire addressed to individuals.

Colonel Crompton's committee had not been very long in existence, however, before the late D. N. Dunlop approached the committee, having succeeded in bringing the electrical manufacturers together into a single trade association, now B.E.A.M.A. to whom the standardisation movement owes a great deal. It was then possible to substitute the method of gathering the views of individual manufacturers, with the subsequent difficulties inevitable in such a method, by inviting representation of the manufacturers' organisation on the committee, and through them obtaining the consensus of opinion of the electrical industry as a whole. Many difficulties were thus overcome, and the team instinct so inherent in the British character came fully into play with the result that the progress of standardisation in the electrical field was rapid.

At the same time much useful information was gained from the records of the American Institute of Electrical Engineers, for a committee of the Institute, under the chairmanship of Dr. F. B. Crocker, had been studying the same subject and had issued its first report in 1889. Germany also was working along the same lines, the Verband Deutscher Elektrotechniker being responsible for the work.

Origin of the I.E.C.

In 1904 the work of Colonel Crompton's committee had sufficiently advanced for him to be able to present a paper on standardisation to the Electrical Congress held that year in St. Louis, U.S.A. Messrs. Crompton (Great Britain), Gonsalez (Spain), Lombardi (Italy) and Ryan (U.S.A.) were appointed as the committee of the Chamber of Delegates to consider and report on the question of international standardisation. As a result of their deliberations the Chamber, as one of its recommendations, proposed " that steps should be taken to secure the co-operation of the technical societies of the world by the appointment of a representative commission to consider the question of the standardisation of the nomenclature and ratings of electrical apparatus and machinery." The delegates were asked to report to their respective technical societies who would communicate with Colonel Crompton as to whether they were prepared to co-operate.

Thus Colonel Crompton was the father of the International Electrotechnical Commission, which was officially constituted in London in 1906, and of which he was for many years the honorary secretary and still is an honorary president. Dr. Elihu Thomson was president, and Dr. A. E. Kennelly, whose recent decease is so deeply regretted, was secretary of the Chamber of Delegates when this resolution was adopted. Moreover, Professor Lombardi, who was elected president of the I.E.C. at last year's plenary meeting in Torquay, was a member of the Chamber as an Italian delegate, and thus took a prominent part in initiating this international movement.

The work of preparing British proposals for submission to the Commission was originally undertaken by the Institution of Electrical Engineers, which set up a committee to act as the British National Committee of the I.E.C. In 1911, however, the whole of this work was handed over to the Engineering Standards Committee and the personnel of the British National Committee of the I.E.C. and of the Electrical Industry Committee of the British Standards Institution became identical, though the members act in a dual capacity.

Electrical Predominance

A glance at the numerical list of the British Standard Specifications will show that a large proportion of the specifications prepared in the early days were for electrical materials and appliances. This will be appreciated from the following list of specifications, it being borne in mind that the numerical order of the specifications is an indication of the date sequence of the original issues: B.S.2, Tramway Rails and Fishplates; B.S.7, Electric Cables; B.S.8, Tramway Poles; B.S.16, Telegraph Material; B.S.17, Electrical Machinery (now superseded by several later specifications); B.S.23, Trolley Wire for Tramways; B.S.31, Conduits and Fittings for Electrical Wiring; B.S.33, Carbon Filament for Electric Lamps; B.S.37, Electricity Meters; B.S.42, Steam Engines for Electrical Purposes; B.S.52, Bayonet Lamp Caps; B.S.67, Ceiling Roses.

The list could be extended. There are at the present time about 800 current B.S. Specifications, nearly 200 of which are of direct interest to the electrical industry.

Enlargement of Scope

The Engineering Standards Committee was incorporated in 1918 as the British Engineering Standards Association and received a Royal Charter in 1929. In 1931, with the agreement of the founders, its scope was enlarged to cover industries other than engineering, and the title was changed to British Standards Institution. The Institution is an entirely independent body, receiving Government support, both by means of a financial grant and by co-operation of technical officers on the B.S.I. Committees, but it is entirely free from any Government control. The work is supported also by technical institutions, trade associations, public authorities, public utility companies, manufacturers and professional engineers. Many of these, besides being contributing members, co-operate directly in the work of drawing up the Standard Specifications by nominating representatives to serve on the committees.

The objects of the B.S.I. are, as its name implies, to draw up industrial standards, and these may be in the form of specifications, test codes, glossaries, codes of practice and the like. The aims of national standardisation are well known to those engaged in the electrical industry, but it may perhaps not be out of place to summarise them briefly as follows:—

Reduction in the time and expense involved in preparing inquiries for quotations.

Establishment of a uniform basis for tenders, thus rendering them more easily comparable.

Possibility of larger production with consequent reduction in cost.

Securing of a greater degree of continuity in employment because stocks can be produced in slack times.

Quicker delivery (both of complete articles and replacements).

Reduction in cost of replacements.

Uniformity in methods of sampling and testing.

Greater uniformity in quality and performance of material supplied, making possible reductions in cost due to:—

(a) More accurate design of apparatus and machinery;
(b) The economic use of a cheaper grade of material, and
(c) The use of a lower factor of safety.

Reduction in the number of misunderstandings and disputes.

The B.S.I. co-operates in international standardisation outside the electrical field and has recently become a full member of the International Standards Association (I.S.A.). There is, of course, a close liaison between the B.S.I. and the British National Committee of the International Commission on Illumination.

Structure of the B.S.I.

The immense field of activity now covered by the B.S.I. can be appreciated to a certain extent from the following review of the principal committees. In the first place there is the General Council, the present chairman of which is Sir Percy Ashley, K.B.E., C.B. Under the General Council there are three Divisional Councils, namely, the Building, Chemical and Engineering Divisional Councils, and a fourth Division, namely, the Textile Divisional Council, is now being constituted. In general it may be said that the Engineering Divisional Council is responsible for the field of activity previously covered by the British Engineering Standards Association. It is, however, impossible to draw hard and fast lines between the various sections of industry and there is a certain amount of elasticity in the allocation of specific items of work to a particular Divisional Council.

The Divisional Councils, with the exception, at present, of the Chemical Divisional Council, work through fully repre-

sentative Industry Committees, which cover the following subjects: Aircraft; chemical engineering; cinematography; colliery requisites; electrical engineering; gas engineering; illumination; iron and steel; mechanical engineering; non-ferrous metals; oil and petroleum; road engineering; solid fuel; photography; plastics; rubber; welding; paper; glass; personal safety equipment; timber; and cement, lime and concrete.

It cannot be too strongly emphasised that the officials of the Institution do not themselves initiate standardisation projects. A request for standardisation must come from some responsible section of industry, such as a technical or trade organisation or a Government Department. On the receipt of such a request it is the normal practice for the Industry Committee to authorise the convening of a conference of the interests directly concerned so as to ascertain whether there is a consensus of opinion that a useful purpose would be served by undertaking the proposed work. In the event of this conference deciding that the work shall proceed, a Technical Committee is set up and, if necessary, sub-committees and panels are formed.

In setting up these committees care is taken to ensure that an equitable balance is maintained between the manufacturer and user interests, and when a draft specification has been prepared it is circulated to all the interested bodies in this country of whom the B.S.I. has knowledge, and is also sent to the national standardising bodies in the British Empire (Australia, Canada, New Zealand and South Africa) as well as to local committees in many other countries. A period of about six months is normally allowed for the submission of comments. All comments received are carefully reviewed and no specification is ever issued as a British Standard in the face of well-founded opposition from any recognised section of industry, standardisation by general consent being the basic principle underlying the whole of the work of the B.S.I.

The Imperial Economic Conferences have given a great stimulus to the co-ordination of all standardisation under one central body in each part of the British Commonwealth. The Government having endorsed this policy, the B.S.I. is endeavouring to give effect to it in this country and is prepared to issue as British Standards any nationally-agreed specifications or codes of practice.

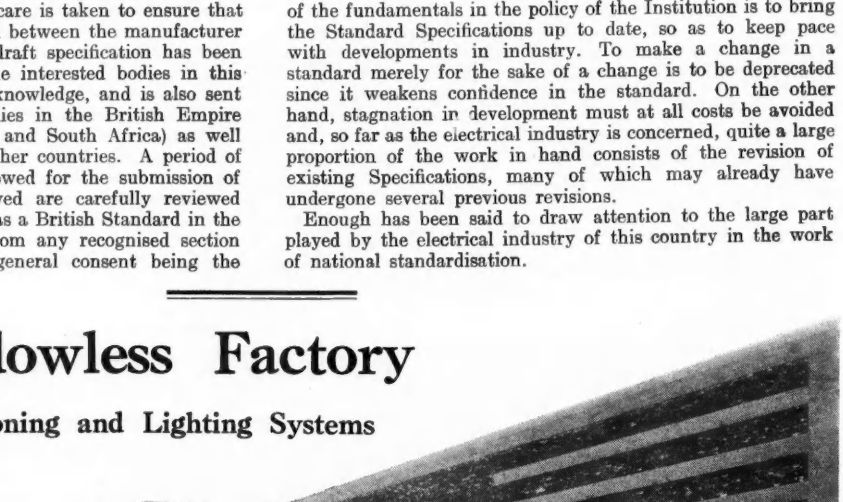
Three Million Specifications Distributed

With regard to the achievements of the Institution, mere statistics do not convey an adequate picture. It has already been mentioned that there are about 800 current British Standards available. During last year 127,000 copies of British Standard Specification were distributed, the total number of specifications distributed by the Institution to date being about 3,000,000. At the present time some 260 different subjects are under active review and it is significant that much of this work consists of the revision of existing Specifications. One of the fundamentals in the policy of the Institution is to bring the Standard Specifications up to date, so as to keep pace with developments in industry. To make a change in a standard merely for the sake of a change is to be deprecated since it weakens confidence in the standard. On the other hand, stagnation in development must at all costs be avoided and, so far as the electrical industry is concerned, quite a large proportion of the work in hand consists of the revision of existing Specifications, many of which may already have undergone several previous revisions.

Enough has been said to draw attention to the large part played by the electrical industry of this country in the work of national standardisation.

Windowless Factory

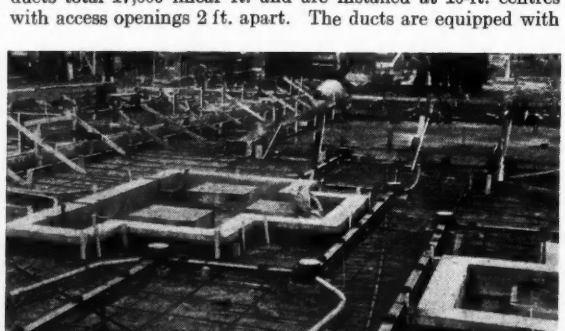
Air-conditioning and Lighting Systems



NINE years ago the Simonds Saw & Steel Co. contracted with the Austin Co. to construct a completely windowless factory at Fitchburg, Mass., United States. The building was completed at that time, but depressed business conditions caused postponement of interior finishing and equipment. The Simonds Co. is now completing this factory, which is air-conditioned and artificially illuminated throughout, and will concentrate its production machinery, now covering some 17½ acres in several plants, into 5½ acres of production space, from which daylight is completely excluded.

Lighting fixtures are being installed in 1,440 positions. Each consists of a 100-W lamp and a simple curved porcelain reflector mounted 16 ft. above the working plane to provide 20 ft.-candles or more throughout each room on a 24-hr. schedule, as the company plans to operate the new plant intensively on a three-shift basis.

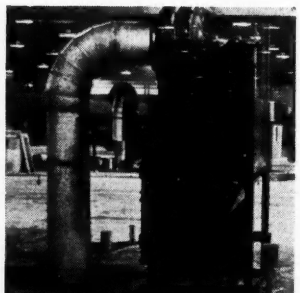
Service mains for water, gas, steam, power, light, air and oil are laid between the floors through ducts direct to more than 1,000 machines and furnace positions. The special power ducts total 17,000 linear ft. and are installed at 10-ft. centres with access openings 2 ft. apart. The ducts are equipped with 280 standard, and 265 special joint boxes; 30½ miles of wire and cable was required to provide power and light.



Section of the 17,000 ft. of special under-floor ducts distributing power to more than 1,000 individual machines

The plant has a connected power load of 6,000 HP and a total of 4,200 electric outlets, which include light, machine power, transformers, switchboard, motor generators and other units. Power is controlled by a 66-ft. main switchboard, beyond which are transformer banks and switchhouses.

Dust and exhaust gases are removed through underground ducts, served by 30 dust removal units. Three underground flue-gas exhaust systems with fans which draw the gases directly away from the furnaces and other units at 63 different positions are insulated with corrugated asbestos and all the metal is covered with special asbestos cement.



One of the thirty dust removal units

The entire building is air-conditioned by Carrier units and controlled through hydrostats and thermostats at four strategic positions. Special "man - cooler" systems have been provided for the comfort of men working at the furnaces. Air will be circulated through the building at the rate of about 400,000 cu. ft. per minute. It enters the structure through louvres on the end walls of four lean-to buildings which adjoin the main building. Water is obtained from four artesian wells by electric pumping. Air is blown through water sprays in each of these structures and is then distributed through 3,000 linear ft. of ducts ranging from 68 and 90 in. at the fans to 26 and 20 in. at the outlets.

EGYPTIAN ELECTRICAL MARKET

Prospects for British Manufacturers

By A. Brookes (Cairo)

THE prospects for British electrical trade in Egypt are improving. During the past few years it has been difficult for English manufacturers to compete successfully with Continental firms owing to the extremely low prices quoted by the latter, supported by Government subsidies and the barter system. Continental prices are 30 to 40 per cent. lower than English prices. In fact, in some cases it has been evident that prices below cost were quoted to secure business. English business has also been handicapped by the fact that manufacturers apparently have well-filled order books, and consequently cannot give early delivery dates.

The happenings on the Continent during the past few months are having a definite bearing on the present trade position with Egypt, and no doubt this will be felt to an increasing degree in the future. The turn of events is placing the English engineering firms in a more favourable position. Continental subsidies will no doubt continue, as will the efforts to conduct business on the barter system, but it is obvious that Continental firms are finding it increasingly difficult to give deliveries in reasonable time. In this respect they are now about on a par with the British firms. Complaints are prevalent that in some cases quality is suffering. Electrical equipment is rated too high without adequate safety margin, with consequent failures and loss of confidence.

Quality and its attendant confidence in reliability is making itself felt in Egypt. The Egyptian Government is carefully scrutinising its spendings and Government engineers are realising that there can be a vast difference between the products of one country and another, and preference is being shown for the superior article. A change of this description must of necessity be slow, but whilst the appreciation of better material is there developments in this direction are sure to continue, and, as time goes on, we can look forward with confidence to British quality being accepted as the standard.

The total value of electrical imports has increased by £E199,009 in three years. In 1936 the value was £E665,171, in 1937 £E715,702, and last year £E864,180 (£E=19s. 6d.). Some information regarding particular items follows.

Motors, Generators and Transformers

The price-cutting struggle has been going on for some years and has recently been intensified. Germany has a "pull" in the supply of electric motors and generators from the fact that her prices for Diesel sets are far below those of competitors and the supply of the electrical equipment is often included.

The value of electric generators, motors and transformers imported during the past three years has nearly doubled. The total in 1936 was £E66,385. In 1937 this increased to £E85,376, and in 1938 it jumped to £E131,944. The principal suppliers during 1938 were Belgium (£E37,497), Germany (£E29,835), United Kingdom (£E21,369), Switzerland (£E12,215), France (£E9,457) and Italy £E7,764). The Belgian share of the business substantially increased in 1938 as compared with the previous year. Germany's share also increased, but England and Switzerland lost ground.

The prices of Continental goods are at least 30 per cent. lower than British, consequently the actual quantity of goods supplied is considerably greater than indicated by the values. For the purposes of Customs the imports under this heading are divided into four sections: (A) Machines weighing 1,000 kilos or more; (B) machines weighing 50 kilos to less than 1,000 kilos; (C) machines weighing 15 kilos to less than 50 kilos; and (D) less than 15 kilos.

The greatest loss of the United Kingdom during 1938 was in section A. In 1937 the value was £E9,789, but it dropped to £E4,933 last year. In section B there was an increase from £E11,647 in 1937 to £E13,861 in 1938. In section C the British trade increased from £E1,044 in 1937 to £E1,160 last year, and in section D from £E861 in 1937 to £E1,415 in 1938.

The Belgian increase in trade was most marked in section A; sections B and D also showed increases, but in section C there was a falling off. Germany's share showed increases in sections A and B, while the other two sections remained steady. France's share showed a falling off under A, C and D, but section B increased. Italy did better all round. Switzerland improved her trade under section B but registered declines in the other sections. The United States share of the business was confined to sections B, C and D, all of which registered increases, although the business was on a small scale.

Electric power is extensively used, where available, by industrial concerns who enjoy special rates. As energetic efforts are being made to increase Egypt's industries the market for electric motors, &c., should increase. Many of the small workshops are changing over to electric power. The development of the textile industry in Egypt is calling for a considerable amount of electrical equipment. The Beida Dyers S.A.E. and the Société Misr de Filature et de Tissage Fin en Coton Egyptien are erecting extensive mills equipped with the most up-to-date machinery, electrically powered. Some 1,200 electric motors are being employed in these mills alone.

Small power stations are being erected in various parts of the country. These are operated by local government bodies. The main power stations in the large cities, such as Cairo, Alexandria, &c., are run by either French or Belgian concerns, and the equipment for these stations is naturally obtained from their respective countries.

The Chamber of Deputies Finance Committee is studying a draft law authorising certain municipalities to issue bonds to the total value of £E3,000,000 for the carrying out of schemes for the supply of water, electric light and drainage.

Electric Cables and Wire

There has been a substantial increase shown in the value of electric cables and wire imported during the past three years. In 1936 the total amount was £E90,170, in 1937 it rose to £E114,120 and last year to £E156,832. England gained most from this increase, the amount supplied in 1938 being £E30,419, as compared with £E6,262 in the previous year. The largest supplier, however, is Germany with £E33,109, but this was £E3,277 lower than in the previous year. Belgium also lost trade, her share being £E30,114, £E14,389 lower than 1937. France increased her share of the business by £E22,330 from £E9,761 in 1937 to £E32,091 in 1938. Holland gained £E2,352 at £E4,175. The United States share improved by £E1,130 to £E1,554, Italy by £E4,705 to £E12,807, and Sweden by £E674 to £E8,776.

The statistics for electric cable and wire imported are divided under two heads, viz., "Submarine and subterranean cables" and "Others." The total amount imported in 1938 under the first heading was £E106,157, leaving a balance of £E50,675 for "Others." In the "Submarine, &c.," section England supplied £E22,766, an increase of £E21,633, and in the "Others" section £E7,653, an increase of £E2,524. France, Holland, the United States and Italy all recorded gains.

Germany's losses were in the cable section, the amount supplied in 1938 being £E4,480 less than 1937. In the wire section an improvement of £E1,208 was shown at £E13,978. Belgium's biggest loss was in the cable section where a decline of £E13,028 was registered and in the wire section she lost £E1,361. Sweden's share also fell.

Telegraphic and Telephone Apparatus

The trade under this heading has steadily increased from £E27,761 in 1936 to £E33,516 in 1937 and £E45,305 last year. England secured the greater part of this trade, but has not benefited by the increase. Her share of the business stood at £E27,438 last year as compared with £E27,679 in 1937. Belgium, on the other hand, has substantially increased her trade —from £E507 to £E11,899. Germany also registered an increase from £E1,290 in 1937 to £E2,140 last year. Sweden was also up by £E232 at £E1,843. France lost £E780 at £E1,142. The United States and Italy are small suppliers, the former sending only £E477 and the latter £E202.

Wireless telegraph and telephone apparatus to the value of £E11,639 was imported during 1938; England's share of the trade amounted to £E10,933. The total trade was more than doubled. The only other country worthy of mention under this heading is the United States. Their business was, however, small, being only £E377 as against £E81 for 1937.

Electro-medical Apparatus, etc.

The total value of imports of electro-medical apparatus increased from £E24,879 in 1937 to £E26,544 in 1938. Germany maintained her lead at £E13,710, but the Netherlands showed the greatest increase with a rise from £E4,902 in 1937 to £E9,188 in 1938. England dropped back from £E4,942 in 1937 to only £E431 in 1938. France supplied £E902, which was nearly three times the value she supplied in 1937, and Japan fell from £E940 to £E678.

England lost ground in electric signalling apparatus. Of the total value imported (£E5,837) England's share was £E2,564, E2,367 lower than in 1937. Germany increased her share from £E1,019 to £E1,388. Sweden, which had not previously competed in this section, supplied £E1,101.

The bulk of the trade in electrical measuring, testing and recording instruments is in the hands of England. The total amount imported during 1938 was about £E20,000, of which England supplied 80 per cent.

Domestic Appliances

The sale of electrical household appliances is affected by the high cost of energy. Special rates are available for large power consumers, but the high rates charged to householders prohibit the wide use of domestic appliances. With an extension of the electrification of the country it is to be hoped that rates will be reduced.

Electric cooking appliances are ideal for Egypt where we have so many months of hot weather, and if charges were reduced to a reasonable level there is every reason to suppose that the sale of electric cooking appliances would see a satisfactory increase in the big towns.

America is the leader in the domestic appliance market. Of the total value of £E17,883 imported in 1938 the United States supplied £E6,656, which was £E3,882 better than the previous year. Germany (£E3,437) and the United Kingdom (£E1,547) showed slight improvements. France, Switzerland and Belgium were also suppliers.

Imports of electric fans fell in value from £E5,156 in 1937 to £E4,381 in 1938. The principal supplies came from Continental manufacturers who quote very keen prices. Italy (£E2,412) was the largest supplier. The English trade fell off, as did that of the United States, and the Netherlands also halved their trade at £E228.

In air-conditioning plant the United States secures most of the business. Apart from a few industrial installations of European make, the most important installations, such as the Houses of Parliament in Cairo and some of the large cinemas, are American. Commercial refrigeration plant is in much the same position.

There is a fair market for household refrigerators but there is room for expansion. Those on sale are practically all American. A cheap rate meter is generally installed for both commercial and household refrigeration and most of the sales are made on the instalment plan. Out of a total of £E9,916 imported during 1938 the United States supplied £E9,773.

Radio Equipment and Lamps

The radio receiving set market has reached an advanced stage of saturation. Too many, and in many cases unsuitable, people are handling this line with the result that ridiculous facilities are allowed. Some of the leading manufacturers have been ill advised by representatives lacking a sound knowledge of the dealers with whom they have placed sets, with the consequence that they find themselves saddled with unwieldy financial positions, and in some cases with substantial losses. The Government tax is a handicap to sales. This tax is at the rate of PT.80 (16s.) per set plus PT.5 (1s.) per valve.

Egyptians are naturally most interested in the local medium wave programme and are content with a 4- to 6-valve set, whilst foreigners (Europeans), who exceed a quarter of a million, are interested in tuning-in to their national or other European stations, mostly on short wave.

The absence of electric current in small centres has limited the sale in outlying districts. Battery sets have not been found satisfactory, as not only do they increase the price to the buyer but the recharging of batteries presents a problem not calculated to improve the relationship between the dealer and the customer.

The imports of radio receivers fell from £E125,066 in 1937 to £E107,935 in 1938. The principal supplier is America at £E45,527, which, however, represents a fall of £E10,621 from the previous year. The next in importance is Holland, whose trade in 1938 amounted to £E27,179, a decline of £E5,209. England remained steady at £E16,414 for 1938.

In the wireless valve trade there was a falling off of £E2,254 in the total value imported, from £E9,600 in 1937 to £E7,446 in 1938. England's share of the business amounted to £E1,347 last year as compared with £E2,692 in the previous year. Imports from Holland also showed a decline, but the United States trade remained steady.

Batteries and accumulators registered a substantial decline; the value (including pocket batteries) in 1936 was £E16,129. In 1937 this had fallen to £E15,088, and last year it dropped to £E6,500. Accumulator imports also showed a rapid decline during the past two years. In 1936 the total value was £E24,160, which improved to £E30,788 in 1937 but fell to £E15,073 last year. The principal suppliers of batteries were Germany, England and Denmark.

Last year registered a fall in the amount of electric lamps imported, from £E47,462 in 1937 to £E39,069 in 1938. This is largely accounted for by the fact that a lamp factory now exists in Egypt. The biggest supplier is the Netherlands with a total of £E16,165 for last year, which compared with £E18,400 in 1937. The next largest suppliers are Hungary and Germany. England's share in the trade amounted to £E2,677 last year, an improvement of £E1,992 on the previous year.

Small electrical requirements such as switches, fuse boxes, insulators, tubes, &c., are now being made in Egypt.

Government Schemes

During the past year or so there has been a lack of Government inquiries of any magnitude. In 1930/1, when the overhead transmission schemes were carried out on the Delta and in Upper Egypt, it was hoped that this would immediately result in the erection of additional pumping stations with electrical equipment. To a certain extent this has occurred on the Delta, but in Upper Egypt only one additional pumping station has been projected.

This slowing up of Government schemes may be due to the fact that the Government Departments have not in recent years materially increased their staff of trained engineers, while there has been a great increase in the amount of work the engineering staff has had to handle, although this work has not been in connection with big schemes.

Although the extension of transmission schemes has not developed as rapidly as was hoped for, it must not be thought that the matter has been entirely neglected. The Government has under consideration the erection in Alexandria, and possibly in Benha, of large generating stations which would be connected with the transmission line. If these schemes come to a head every small town and village in the Delta area will be assured of an electricity supply. This should considerably simplify matters with regard to irrigation problems.

There are large irrigation development schemes on the tapis and the Government has set aside in its last budget several million pounds for this purpose. Engineering firms, both mechanical and electrical, would benefit considerably from this work, although it must be borne in mind that the major portion of the money would be spent on canalisation.

Among the adjudications recently settled are the Boast water scheme which totalled £E131,000, and the Fayoum district water scheme amounting to £E115,000. The latter includes a generating station with water turbines with 15 kM of overhead transmission line connecting three pumping stations with the power station. There have also been one or two extensions to town supply power stations. There has bee na lack of town lighting schemes since 1933.

There have been some extensions to drainage schemes and most of these plants are electrically driven. We have also seen extensions in connection with the pumping stations at Nag Hamadi, and two additional pumping stations in the Cairo district, *viz.*, Rahawi £E32,000 and Bayadia £E 27,000. These schemes called for a certain amount of electrical equipment; in some cases the pumps, and in others merely the accessories, are electrically driven.

The Ministry of Public Works recently called for tenders for the supply and erection of an electrically driven pumping station for drainage at Edfu and Kilh in the Asuan province.

Asuan Electrification

The much talked of Asuan electrification scheme has come to the fore again lately. A question was raised in the Egyptian Parliament on April 12th by H. E. Ismail Sidky Pasha, who advocated pressing on with the scheme. Dr. Ahmed Maher replying for the Government said that they were alive to the benefits to be derived from the scheme, and its importance to the establishment of industries such as the manufacture of fertilizers and the development of the iron ore deposits at Asuan, but the financial position had changed since the scheme was first considered owing to new commitments in connection with national defence. The Government had, therefore, decided that the scheme required amendment.

The Anglo-Egyptian Barracks Committee, formed to carry out the terms of the treaty regarding the provision of barracks in the Canal Zone, has approved the scheme for the erection of an electric power plant to supply the barracks with electric light. The cost of the scheme is estimated at £E250,000. The matter has now been referred to the legal services for the preparation of the terms of contract.

For the time being there is but little prospect of early development of new town lighting schemes.

In the main cities, such as Cairo and Alexandria, experiments in improving street lighting are being carried out, particularly along the Corniche Road on the sea front at Alexandria where various forms of lighting have been on trial for some years. Floodlighting is developing. During the recent celebrations for the marriage of Princess Fawzia to

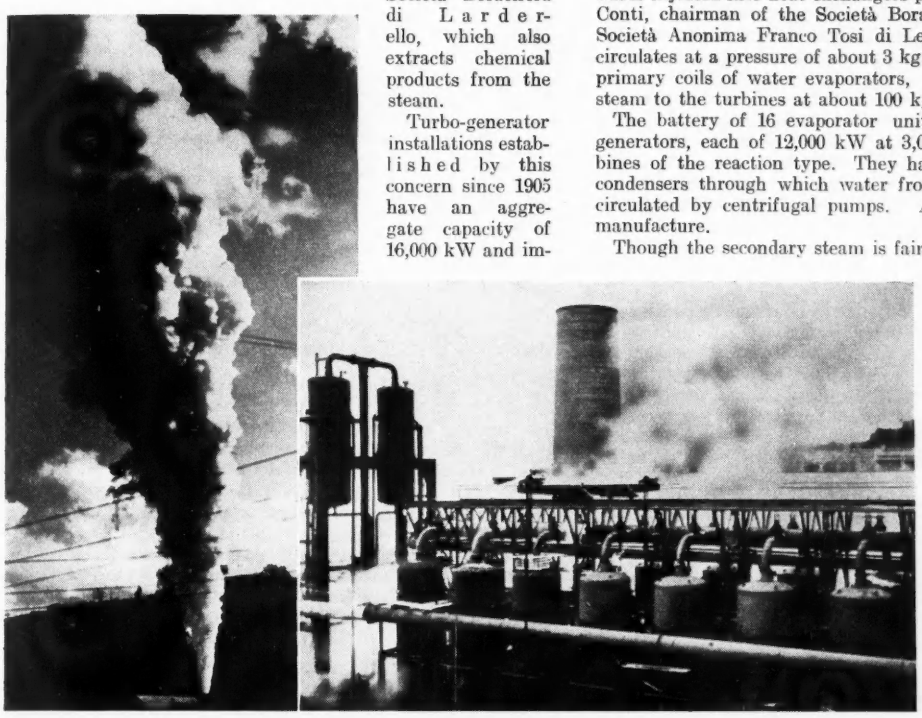
(*Concluded at foot of opposite page.*)

NATURAL STEAM POWER

Installations in Tuscany

THE geyser-like gushing of natural steam through rock fissures, known as the soffioni of Tuscany, a mid-northern province of Italy, continues to be increasingly utilised as a source of heat for power generation by the Società Boracifera di Larderello, which also extracts chemical products from the steam.

Turbo-generator installations established by this concern since 1905 have an aggregate capacity of 16,000 kW and improved methods of rock drilling have yielded more consistent steam jets so that the latest plant built is of 50,000 kW, but designed for possible enlargement to 75,000 kW. It is said to be the equivalent of a modern boiler installation consuming about 200,000 tons of coal per year, and the electricity it generates is used for traction by the Italian State Railways Administration.



Steam jet at Larderello and (right) a battery of heat-exchangers

The natural steam is not used directly to drive the turbines, since it contains deleterious gases and chemical substances, but is injected into heat exchangers patented by Prince Ginori Conti, chairman of the Società Boracifera, and built by the Società Anonima Franco Tosi di Legmano. The raw steam circulates at a pressure of about 3 kg. per sq. cm. through the primary coils of water evaporators, which deliver "clean" steam to the turbines at about 100 kg. per sq. cm.

The battery of 16 evaporator units serves for electricity generators, each of 12,000 kW at 3,000 RPM, driven by turbines of the reaction type. They have double exhausts into condensers through which water from two cooling towers is circulated by centrifugal pumps. All this plant is of Tosi manufacture.

Though the secondary steam is fairly pure, it has been considered prudent to construct certain parts of the turbines of metals that are resistant to corrosion. The blading and labyrinths needed special attention; the shaft is very rigid, its normal speed being considerably lower than the critical speed, while multiple steam valves of large dimensions are operated in parallel under servo-motor control.

Steam is exhausted at both ends of the central rotor into twin condensers, claimed to be the largest of their kind so far made in Italy and to be designed on new principles. Each chamber is fitted with two sets of spraying nozzles, each consisting of four branching inlets. The holes in the upper sets are so disposed as to form intense cross-spraying zones which the steam encounters first, before descending to the lower sets which form a thicker "curtain" of spray for completing condensation.

Extraction is effected by piston-type air pumps, while the hot water is delivered to two cooling towers by four centrifugal pumps, each of 2 cu. m. per second capacity, with a driving motor coupled direct to its horizontal shaft. The risk of eventual pump corrosion has been allowed for by choosing resistant materials and allowing more than ordinary thicknesses.

Egyptian Electrical Market

(Concluded from opposite page)

the Crown Prince of Iran, and a few months earlier for the marriage of His Majesty King Farouk, leading public buildings and statues were floodlighted. Early this year the Pyramids were floodlighted. There is also considerable extension in the use of neon tubing both for advertisement and decorative purposes.

Practically all business is done through agents appointed by manufacturers. In some cases the big manufacturers have opened a branch in Egypt, but usually these branches hold, in addition, a few first-class agencies for complementary lines. For instance, a group of well-known British engineering and electrical manufacturers have their own organisation in Egypt, and one of the leading British electrical firms has a branch here. Other leading British electrical manufacturers have appointed a substantial firm in Egypt handling complementary lines to act as their agents and have sent out their own electrical expert to assist the agents to look after their interests. Several German engineering and electrical manufacturers have their own organisations.

Great care should be exercised in the appointment of agents, not only to see that they are not running competitive lines but also that they are technically qualified to handle the business, and have the necessary knowledge as to where business is to be secured.

All manufacturers submitting tenders for supplies to the Egyptian Government are required to have an authorised representative in Egypt. In electrical engineering we have more representatives than there are sound electrical concerns competent to handle the business. There are numerous small men handling lighting fittings, etc., with the result that the value of this business lies in an accumulation of small orders. There is a considerable amount of building activity in the main cities which calls for electric lighting fittings of all types.

Ionisation in Paper Cables

THE "treeing" type of cable breakdown, in which carbonised tracks are found on the surface of the cable papers, indicates a fairly advanced stage of dielectric failure, due to gaseous ionisation. At an earlier stage no carbonised tracks are visible, but the presence of polymerised compound ("wax" or "cheese") indicates gaseous discharge. Production of visible quantities of wax may take a long time, and a more sensitive indication of the earliest stages of deterioration, known as the "magenta dye test," has been developed by Callender's at their Wood Lane research laboratories.

Gaseous discharge, too small to be visible on impregnated papers, changes the physical properties of the latter by forming invisible traces of wax on their surfaces. The process evolved is first to remove the impregnating compound (in petrol) from the papers, which are then immersed in a dye consisting of magenta dissolved in water. The paper absorbs the dye and becomes a deep maroon colour except at points of discharge where the natural colour of the paper is retained.

Incidentally, this method played an important part in investigations at the laboratory to determine the mechanism of breakdown in high-voltage cables. Also, 251 papers taken from the gas-pressure cable which passed the Arnhem test (at 260 kV for 400 daily heat cycles) without loss of efficiency, in which respect they are said to have had an advantage over other British cables, were shown by the magenta dye test, to be entirely free from ionisation.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Multiple-earthed Neutrals

MR. T. C. GILBERT'S article in the ELECTRICAL REVIEW of July 28th deals with three subjects, not necessarily connected: the bare neutral in particular is apart from the other two.

The bare neutral or an equivalent was extensively used for ship wiring about 1885-1890; I cannot speak for later years. Generally the return was made by connection to the steel structure of the ship at each fitting. Mr. J. S. Raworth devised a whole line of fittings for such wiring; the lampholders had a single insulated contact and the metal of the socket and of the bracket, &c., were connected to the steel by a lug and tapbolt. So far as I remember the conductors were not provided with a conducting sheath. Messrs. Mavor & Coulson introduced a concentric system with a bare metallic sheath for the return conductor. My late brother, W. B. Sayers, was concerned in the design of the very neat and convenient accessories, joint and tee boxes, &c. I think this system was also extensively used in ship wiring and in some lighting, &c., jobs not on public mains.

In the early 'nineties Mr. Andrews had a similar concentric bare sheath return, which he tried to push for consumer's wiring. The supply engineers did not approve of it; and Mr. Andrews was rather annoyed with me because I refused to connect such jobs without transformers between the company's meters and the consumers' wiring. How far this system was used in private installations I do not know; there were a few supply undertakers who accepted it, after getting a rather cautious approval from the Board of Trade and the P.M.G. I think I am right in saying that the Admiralty never used the uninsulated return in either form.

So far as I can see there is little reason to object to earthing to water mains for protective purposes, so long as the connection is made on the mains side of the house piping. It should not be made to a common service pipe supplying a number of consumers in a building or block of houses. Water mains should certainly not be called upon to carry out-of-balance currents on a three-wire system. The water authority is entitled to veto the connection, or to regulate the conditions, especially with regard to the maximum fault current which may pass. There is much more reason to object in DC than in AC systems. I do not recall any case of trouble in this country on AC systems except in one or two cases where the connection was made to a common service pipe far from the main.

As regards multiple earthing of the neutral, this seems harmless where a neutral conductor forms a continuous part of the supply system especially on overhead systems in rural districts. If the earth at any consumer's position is of high resistance there is so much less chance of a dangerous current passing through a person to a damp floor, &c., but if the possibility of dangerous potential difference between consumers' appliances and local earths, floors, &c., exists, probably the earth leakage trip operating on p.d. affords the best security against such danger. But it is not the only effective method.

Beckenham, *July 30th.* H. M. SAYERS.

Modern Poultry Farming

With reference to an article by Mr. C. A. Cameron Brown appearing in your issue of July 21st I should like to call attention to a report of some work conducted in 1931 by Parkhurst and myself.

The difference in margins for a dozen eggs between the two systems of light, namely, the evening lunch and the use of lights morning and evening, is approximately 0.1d. per dozen eggs produced. As light would be employed for six months at the most it will be seen, therefore, that the additional margin in favour of the use of lights at both ends of the day is not likely to exceed 6d. This would fall within the limits of experimental error. The choice of system must be determined by the situation of the farm and the capital available.

The comparison that has been drawn between the results of work at the National Poultry Institute and the Lancashire Farm Institute is not strictly accurate. The findings happen to coincide, but the experimental material was vastly different. In one case the conventional system of keeping poultry was employed, that is, where birds had comparatively large floor space on which to be fed and exercised; in the other the more recent development of the laying battery cage was employed.

There is an absence of exact data on the question of lighting birds in cages, but on at least one farm with which I am acquainted, where accurate cost accounts are kept, it would seem that a system of all-night lighting, using lamps of a relatively low wattage, has advantages which are at least worthy of investigation. All-night lighting has to the average poultry farmer the merit of not requiring comparatively expensive switchgear. In connection with this more recent development in commercial egg farming there would seem to be a very large field indeed. The birds are housed individually in cages, and it is not uncommon to find them being maintained at the rate of about five thousand to the acre. This apparent congestion would mean a considerable reduction in the overhead charges, and it is reasonable to suppose that the poultry producer of this type would favour the installation of lights more than one with houses more widely spaced.

At the time of the Bulletin referred to above it was assumed that the mechanism of changing the season of production resulted from an increased food intake. An interesting contribution correcting this view appeared in the *Journal of Agricultural Science* in July, 1933. In this it was shown that the primary cause of stimulation was the effect of light upon endocrine glands, the chief of which is the anterior pituitary. This, however, is probably of academic interest, for the producer is mainly interested in the margin between costs and returns.

I. W. RHYS,
London, S.E., *July 27th.* Joint Editor, *Poultry World.*

Locating Cable Faults

I have read with interest the article in this week's REVIEW on "Locating Cable Faults" by Mr. Woodiwiss. I think he casts quite unjustified aspersions on distribution engineers when he states that they are reluctant to use the Murray loop test because it is not so simple as it appears at first sight.

I have yet to come across a faulty cable section along which there was not at least one consumer away and the house locked up. This makes any form of testing impossible, and if supply is to be restored speedily it is essential to cut the cable to locate the fault. HENRY C. THOMPSON, B.Sc., A.R.T.C.

Glasgow, *July 30th.*

"Fetish" of University Degrees

As one who was not brought up in "the halls of learning," may I humbly suggest to education authorities that they should open technical school appointments to candidates other than "graduate teachers."

At technical colleges where training is carried to degree standard, a teacher who has himself attained that standard is absolutely essential; not so much because he knows more on one subject as the fact that he has the academic training necessary for mathematical treatment of subjects, together with the requisite experience to enable him to direct studies in the right channels. But innumerable vacancies occur for teachers in technical institutes and junior schools for which a degree is neither necessary nor, indeed, desirable. If, as is generally the case, the purpose of the training is vocational, the instructor would better be a person who has been "through the mill" himself while possessing technical qualifications having a practical rather than an academic bias.

Speaking from my own experience, I can confidently say that I absorbed more technical knowledge in a year from a qualified engineer who undertook evening classes than during several years afterwards under teachers with an academic outlook on things. To be fair, let me add that I can also recall one or two first-class teachers of university standing who could make subjects like mathematics and physics fascinating. But gifted pedagogues are by no means an exclusive possession of the universities. In subjects like electrical engineering equally good instructors may be found in the manufacturers' shops, the supply, steel and mining industries: men who have first-hand knowledge derived from years of experience of engineering equipment and possess technical qualifications of the acknowledge high standards set by professional institutions.

Is it a question of graduate's teaching training? Woodwork and metalwork instructors in schools are accepted by the Board of Education from the ranks of skilled manual workers who have qualified by taking a City and Guilds Certificate. Here is a definite acknowledgment that teaching training at college is by no means essential. Why cannot the B.O.E. accept a final City and Guilds Certificate in, say, electrical engineering practice, or the I.E.E. examination, together with industrial experience, as qualifying for at least junior teaching appointments in these subjects Many of us with lecturing experience cannot apply such appointments, probably because no equivalent qualification is recognised.

Swindon, *July 30th* H. REES.

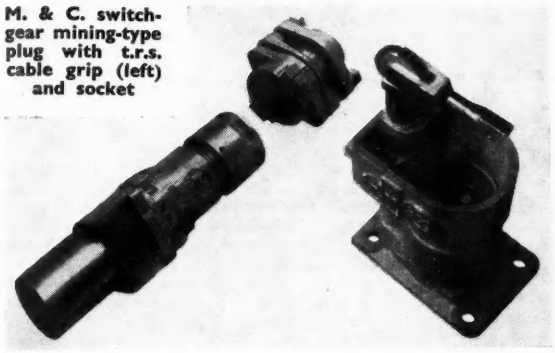
NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Mining-type Plug and Socket

A BUXTON-CERTIFIED 100-A, 660-V mining-type plug and socket designed to B.S.S. No. 279 has recently been introduced by M. & C. SWITCHGEAR, LTD., Kelvinside Works, Kirkintilloch, Glasgow.

It has three main controls and an extra pin and tube contact for a pilot connection for electrical interlocking. The body is of cast gunmetal and the plug nose is of hard manganese bronze. The contact pins and tubes are of hard-drawn brass and the tubes are fitted with annular springs to ensure



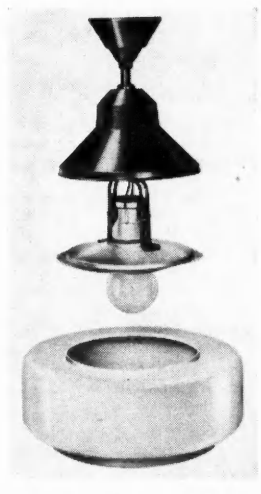
M. & C. switchgear mining-type plug with t.r.s. cable grip (left) and socket

contact pressure. High-grade moulded material with pressed liners is used for the insulation.

There are two large earthing terminals for the earth core and screen. A universal handle is fitted to the operating bolt to facilitate the insertion and withdrawal of the plug, and the withdrawing bolt is removable from the front of the socket by undoing two screws. Mechanical interlocks to suit different applications are available, and caps for protecting the terminals can also be supplied. A t.r.s. cable gland has a split brass cable grip and rubber packing rings and a similar p.a. gland has two additional clamps, one for the pliable armouring and the other with a rubber clamping ring for the outside tough-rubber sheath.

Office Lighting Unit

BROWN BROTHERS, LTD., Great Eastern Street, E.C.2, have sent us a description of the "Duco" diffuser lighting unit which is particularly suitable for office and showroom lighting.



"Duco" office lighting diffuser unit

It has a flashed opal globe 14 in. in diameter and 6 in. deep, while an unusual canopy dispenses with the more usual three-screw method of holding the globe.

The canopy screws down on to the glass and holds it firmly in position. The globe itself is supported on an internal reflector which redirects a large proportion of the upward light on to the area to be illuminated, so that the light source is retained in the correct focal position, enabling tungsten-filament lamps of from 100 W to 200 W and discharge lamps of 80 W to 125 W to be used. A special focusing stirrup is fitted to this unit.

The ceiling plate is ball jointed and drilled for mounting direct to B.S.S. boxes. The metalwork is finished in coinage bronze.

Sound Reproducing Equipment

Several items have been added to the range of sound reproducing equipment made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.

One of them is a 20-W amplifier for AC mains embodying automatic microphone-gain control and bass-treble "uplift" tone controls to avoid difficulties associated with speakers who constantly change their distance and direction from the microphone, and an approximate level is ensured even when the microphone is being shared by two or more speakers or vocalists at varying distances. It allows the volume control to be further advanced without risk of acoustic feed-back; the tone controls for the treble and bass are independent, a four-stage circuit being used with two KT.66 power tetrodes in "class A" push-pull in the output stage.

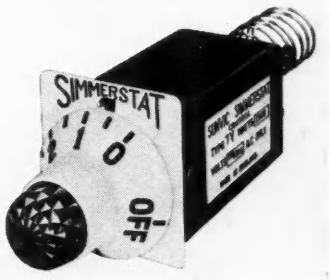
The "De Luxe" 20-W amplifier is available in chassis form, with protective metal cover; as a rack mounting panel assembly, or automatic record-changing gramophone assembly.

To operate with this and all other amplifiers in the "de luxe" range, a moving-coil microphone has been specially developed for public address work, with a recessed rubber-mounted socket with bayonet fitting in the base for quick connection to specially designed table and floor stands.

In the wide range of power speakers for public address work, the exponential horn model is completely weatherproof, access to the terminals being provided by means of a watertight cable gland. Within this aluminium case is a device that can not only be adjusted for matching to the output circuit of any amplifier, but also allows the audio-output of the speaker to be regulated to any chosen maximum irrespective of any other speakers on the same circuit. While designed for an input of 6-W (AC), the alni-metal magnet allows an adequate audio-output to be obtained from an input as low as 2 W. The unit itself is detachable from the spun aluminium horn, and an adjustable bracket allows the assembly to be mounted on a girder or any other convenient fixing or tripod.

Hotplate Regulator

The "Simmerstat" is a control unit introduced by SUNVIC CONTROLS, LTD., Stanhope House, Kean Street, Aldwych, London, W.C.2, for providing continuous heat regulation for hotplates and boiling rings from no-load to full load.



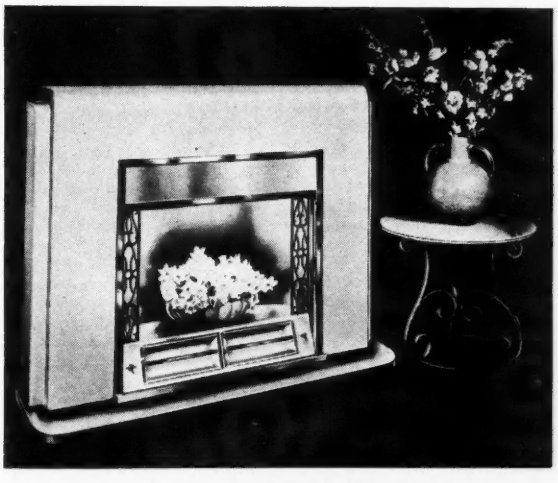
"Simmerstat" hotplate control

It operates by varying the average input to the plate on a time basis, opening and closing the electric circuit for short related time intervals. The longer the "off" and the shorter the "on" times, the lower the input and temperature. The regulator fits in the position normally occupied by the three-heat switch. This method of fixing permits the use of a simplified single-winding hotplate, and a pilot lamp in the control knob serves as an indicator.

New Berry Fire

A recently introduced "Chameleon" fire of BERRY'S ELECTRIC, LTD., 24, Newman Street, London, W.1, embodies automatic change of colour and, in addition, a new sunlight effect from the top by two concealed floodlights.

Unlike the previous models, the fire bars are disposed horizontally in two separate chromium reflectors and are tilted slightly backwards so that the heat is directed upwards. The bowl of real or imitation flowers can, with this model, be retained when the fire is on. Separate switches are provided for each element.

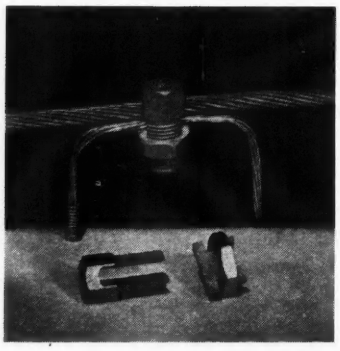


New Berry "Chameleon" fire

D

Line Taps

In line taps with a loose fixing pad there is always the possibility that the pad will slip out during erection and be lost. To avoid this the latest line taps of the BOWTHORPE ELECTRIC CO., LTD., Goodtric Works, Purley Way, Croydon, have been designed with a combined pad and nut, the new type comprising two parts only.



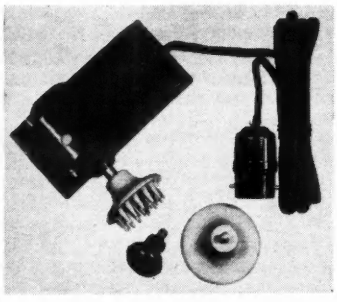
"Goodtric" line tap

The taps, known as "Goodtric" series "HD," are made from heavy section brass and are supplied in five sizes for conductors up to 0.18, 0.26, 0.32, 0.40 and 0.44 in. in diameter.

Bakelite shrouds are available for line taps near windows and for use in accessible positions on insulated service lines.

Massage Vibrator

The new vibrator of the COMBI ELECTRIC CO., LTD., 85, Cromwell Road, London, S.W.7, known as the "Masso," is of simple construction and low in price. It is designed for operation on AC supplies of 100/110 V or 200/250 V and has an attractive mottled brown bakelite case.

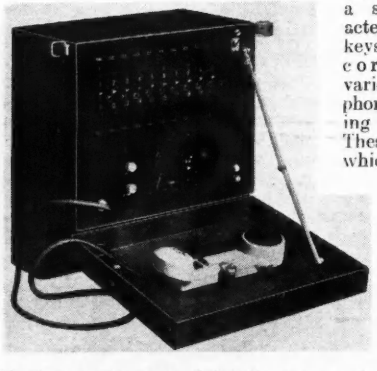


Combi vibrator

Attachments provided comprise a solid rubber knob for muscle toning, a rubber pronged attachment for scalp massage and a cleansing bell for skin treatment.

A.R.P. Communication System

Since standard types of communication systems may not fulfil the needs peculiar to A.R.P. work the AUTOMATIC TELEPHONE & ELECTRIC CO., LTD., Strowger Works, Liverpool, 7, has devised an emergency telephone system which comprises a master "station" of a semi-portable character equipped with keys and indicators corresponding to various extension telephone sets communicating with the wardens. These telephones sets, which are of a robust military type suitable for use in exposed situations, are connected to the master station by a single pair of wires and a third (earth) wire. When a warden requires to speak with the executive official he depresses the signal button on his extension set, thus operating the corresponding indicator on the master station. The provision of an alarm key enables this to be accompanied by an audible warning as and when required. The executive operates the corresponding line key and conversation proceeds.



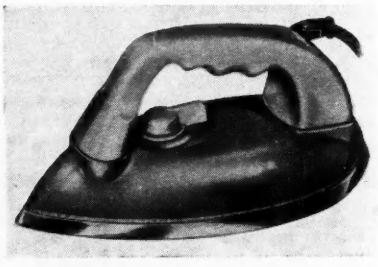
Master equipment of A.R.P. communication system

To signal a warden, the executive operates the appropriate line key and depresses the individual ringing key, causing the buzzer in the extension set to vibrate. To enable the executive to address in emergency all wardens simultaneously a common signalling and ringing facility is provided. Should gas masks have to be worn by the defence unit, thus rendering the ordinary transmitter of the telephone useless, throat transmitter attachments can be plugged into the telephone handsets, which pick up and convert the larynx vibrations into speech. The system is entirely independent of the mains supply, and so is unaffected by mains failure and "black-outs."

The master station is made in two standard sizes, equipped for 10 or 20 extensions. It is not essential that the maximum extension capacity should be employed.

A Back-pointed Iron

BRITISH ELECTRIC DOMESTIC APPLIANCES (1938, LTD., Bedal Works, 27, Sandy Lane North, Wallington, Surrey, consider that the square heel of the ordinary electric iron serves no useful purpose, impedes the backward movement, causes ruffling and creases the fabric. In the new "Mary Ann Doubleway" automatic electric iron for AC or DC, therefore, they have continued the sole plate backwards beyond what would be normally the square heel to a point, thereby facilitating backward movement and increasing the ironing surface by 30 per cent. The back point can be used also in the treatment of frills, &c.



"Mary Ann Doubleway" electric iron

Instead of a rest for use when tilting the iron, which is considered to be generally an unsatisfactory practice, a horizontal asbestos-lined stand is included as part of the equipment, and it forms the base of the container in which the iron can be stored.

In powder blue and ivory finish, the new iron has a cover of "Armco" steel, vitreous enamelled. The automatic feature incorporates a bi-metal thermostat and heat setting is effected by a cam which is moved by a control knob marked with the settings for various fabrics.

Line and Track Relay

Improvements have been carried out in the vane type AC relay of the SIEMENS AND GENERAL ELECTRIC RAILWAY SIGNAL CO., LTD., East Lane, Wembley, a new type, RS.421, superseding Nos. 475 and 476.

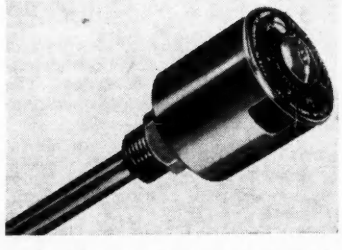
The new relay is different in shape and serves the purpose of the two previously marketed, the generally accepted maximum contact requirements still being obtainable. It can be used as a line relay or as a track relay on short track circuits when ballast resistance is high.

Vane type AC relay

The contact springs are of hard rolled phosphor bronze mounted on a steel rocker bar and the contact fingers are fitted with silver tips of a special shape which give a rubbing action. The renewable fixed contacts are produced in dense silver-electro-graphite material and the relay can be equipped with a total of twelve independent contacts.

Water Heater Thermostat

The type TQ water-heater thermostat recently introduced by SUNVIC CONTROLS, LTD., Stanhope House, Kean Street, Aldwych, London, W.C.2, operates on the expansion-rod principle and is designed to give long service without attention after setting, mainly because of the negligible wear on the switch mechanism and contacts.



Sunvic water heater thermostat

The terminals and sensitive and positive snap switch are housed within the 1.875 in. diameter instrument head. Adjustment is by means of a knurled knob and the setting is not effected by the mounting position. The rating is 15 A. 250 V, AC and for the three scale lengths 12 in., 18 in. and 24 in. the scales are 20-200 deg. F., 80-200 deg. F. and 100-200 deg. F., respectively.

SUPPLY AND RATES

Position of Local Authorities

By J. C. Petersen, A.C.I.S.

(*Secretary, South Shields Corporation, Electricity Supply Department*)

THE valuation of electricity supply undertakings for the purposes of local rates has recently received very serious consideration from several quarters with a view to a uniform and equitable basis of assessment. Allied with this question is the payment of rate relief out of the profits. The Electricity Supply Act, 1926, provides that the amount which may be applied in aid of the local rate in any year shall not exceed 1½ per cent. of the outstanding debt of the undertaking, and that after March 31st, 1930, no sum shall be paid in aid of the local rate unless the reserve fund amounts to more than one-twentieth of the aggregate capital expenditure.

There are in operation special Acts relating to other industries, notably the Advertising Stations (Rating) Act, 1889. "An Act to amend the law with respect to rating places used for advertisements," and the Railways (Valuation for Rating) Act. "An Act to amend the law relating to the valuation for rating purposes of hereditaments occupied by railway companies and for purposes connected therewith." Why not a special Act for the rating of electricity supply undertakings?

Answers to questionnaires sent out by numerous undertakings at various times regarding rates show that the amounts paid in rates vary from 1.47 per cent. to 33.8 per cent. of the total revenue. Although income is only one of the factors to be taken into consideration when making a valuation, the returns show that there is apparently no common basis or uniformity with regard to these valuations. Asked for the basis of assessment only a small number gave "hypothetical tenant" as an answer; other answers were "not known," "revenue," "revenue and expenditure," "valuation by professional valuers," "private valuation," "capital cost," etc.

The "Hypothetical Tenant"

The generally accepted method of assessment is on the "hypothetical tenant" basis. According to Ryde on "Rating" the term is not used in any statute. "The property to be rated must be assumed to be let and the fact that it is occupied by the owner is immaterial. All possible occupiers including the actual occupier must be taken into account as possible tenants from year to year. It is believed that the first appearance of the phrase in a reported case is to be found in R. *v.* West Middlesex Water Works Company (1859)."

The fundamental basis of all rating assessments is the annual rent a hypothetical tenant might reasonably be expected to pay for a property if the landlord undertook to bear the cost of repairs, insurance and other expenses necessary to maintain the property in a state to command such rent, and to arrive at this figure the principal items to be taken into consideration are "tenant's capital," which is probably the most debatable point, "tenant's profits" and "tenant's rates and taxes." Before the passing of the Rating and Valuation Act (1925) no doubt many items were included under "tenant's capital" which since that date would not be allowed. Section 24 of this Act reads as follows:—

"For the purposes of making a revision of valuation lists under this part of the Act, the following provisions shall have effect with respect to the valuation of any hereditament other than a hereditament the value of which is ascertained by reference to the accounts, receipts or profits of the undertaking carried on therein:—

"(a) All such plant or machinery in or on the hereditament as belongs to any of the classes specified in the Third Schedule to this Act shall be deemed to be part of the hereditament.

"(b) Subject as aforesaid, no account shall be taken of the value of any plant or machinery in or on the hereditament."

The following classes of Machinery and Plant are to be deemed to be part of the hereditament.

"1. Machinery and plant (together with the shafting, pipes, cables, wires and other appliances and structures accessory thereto) which is used or intended to be used, mainly or exclusively in connection with any of the following purposes, that is to say:—

"(a) The generation, storage, primary transformation or main transmission of power in or on the hereditament; or

"(b) The heating, cooling, ventilating, lighting, draining, or supplying of water to the land or buildings of which the hereditament consists, or the protecting of the hereditament from fire."

According to Faraday on "Rating":—

"The method to be adopted in arriving at the rateable value of a special hereditament, owned and worked by a company is, therefore, as follows: The gross receipts must first of all be obtained; from these the working expenses, the expenses of management, and the rates and taxes payable by the company are deducted, the result is the profit accruing from the undertaking. The hypothetical tenant, who has, it is assumed, sunk capital in the concern, requires interest on it in the form of profits, etc.; these have to be deducted, and the balance left is the amount due to the landlord, in other words the landlord's share (*i.e.*, the rent or gross value). The deductions to be made from this gross value to arrive at the rateable value of the property are the expenses of insurance, the repairs necessary to keep the property in a state to command the rent, including a depreciation or renewal fund which a prudent landlord would set aside to reimburse himself at the end of the life of the undertaking."

The following example valuation is calculated on actual figures of revenue and expenditure, but the deductions are what in the writer's opinion are fair and proper.

DRAFT VALUATION

	£	£
REVENUE:		
Sale of current		116,079
Showroom profit		607
Total		116,686
WORKING EXPENSES:		
Generation (see Statement No. 1)	22,698	
Repairs to meters	2,222	
Distribution, wages	2,172	
Public lamps	1,382	
Management expenses	10,531	
Insurance	497	
Showroom	739	
*Rates (£9,462 at 12/-)	5,677	
		45,918
		70,768
DEDUCT OCCUPIER'S SHARE†:		
5/12ths of £45,918	19,132	
Tenant's capital (see Statement No. 2)	£153,166	
Cash at bank	2,000	
Coal	500	
Stores	5,602	
	161,268	
Less 3/12ths of slot-meter collections, £36,429	9,107	
	152,161	
	171,293	
17½ per cent. of £171,293	29,975	
Renewals (see Statement No. 3)	6,472	
		36,447
		34,321
Landlord's deductions (see Statement No. 4)		24,859
		*£9,462

† As it would take four to five months before the accounts would be paid, and as the occupier has to provide sufficient capital to keep him going during this interval, five-twelfths of the working expenses is generally taken as a reasonable figure. The item "coal" is for extra supplies in view of strikes, etc. As cash is collected daily from the prepayment meters a deduction of three-twelfths of the annual collection is made. 17½ per cent. on the occupier's share is reasonable and has been allowed and is made up as follows: Interest, 5 per cent.; trade profits, 10 per cent.; risks and casualties, 2½ per cent.

STATEMENT No. 1 (Working Expenses)

	£	s.	d.
GENERATION:			
Coal	7,566	10	10
Fuel and ash handling	246	17	4
Oil, water, stores, etc.	679	4	6
Salaries and wages	5,693	6	3
Energy purchased	8,512	0	2
	£22,697	19	1

STATEMENT No. 2 (Tenant's Capital)

	£	s.	d.
Amount as per statement (see Statement No. 5, A + B)	233,904	0	0
Deduct A.W.S. installations	104,430	0	0
	129,474	0	0
Less 25 per cent. to bring to present value	32,368	0	0
	97,106	0	0
Add:			
A.W.S. installations £104,430			
Total payments of installation costs since the inception of the scheme 48,370			
	56,060	0	0
	£153,166	0	0

STATEMENT No. 3 (Renewals)

	£				£
Buildings	1,292	30 years at 3 per cent. sinking fund		.0210	27
Machinery	8,782	20	,, ,, ,,	.0372	327
Mains	11,215	25	,, ,, ,,	.0274	307
Meters	97,008	15	,, ,, ,,	.0537	5,209
Transformers	2,500	20	,, ,, ,,	.0372	93
Electrical instruments	2,470	20	,, ,, ,,	.0372	92
Office furniture	1,839	10	,, ,, ,,	.0872	160
Domestic appliances	1,893	10	,, ,, ,,	.0872	165
Showroom	2,475	20	,, ,, ,,	.0372	92
	£129,474				£6,472

STATEMENT No. 4
(Landlord's Statutory Allowance)

RENEWALS:	£				£
Buildings	89,433	30 years at 3 per cent. sinking		.0210	1,878
Machinery	170,776	20 ,, ,, ,, fund		.0372	6,353
Mains	344,843	25 ,, ,, ,,		.0274	9,448
Transformers	17,378	20 ,, ,, ,,		.0372	646
Electrical instruments	29,988	20 ,, ,, ,,		.0372	1,115
(See Statement No. 5)	£652,418				£19,440

REPAIRS:	
Buildings, engines, boilers	2,847
Repairs to cables	847
Distributing stations	646
Lamps	709
	£5,049
Fire insurance	370
Total	£24,859

STATEMENT No. 5
(Landlord's and Tenant's Capital)

Description	Total as per abstract of accounts	Deduct capital not subject to depreciation	Tenant's capital	Landlord's capital	Tenant's capital charged to revenue
	£	£	£	£	£
Land	10,573	10,573	—	—	—
Buildings	90,718	—	1,285	89,433	7
Machinery	179,558	—	8,782	170,776	—
Mains	356,023	—	11,180	344,843	35
Meters	97,008	—	97,008	—	—
Transformers	19,878	—	2,500	17,378	—
Electrical instruments	32,458	—	2,470	29,988	—
Office furniture ...	1,020	—	1,020	—	819
Engineering expenses	2,279	2,279	—	—	—
Cost of 3% stock ...	190	190	—	—	—
Domestic appliances ...	1,893	—	1,893	—	—
Assisted wiring ...	104,430	—	104,430	—	—
Showroom	2,475	—	2,475	—	—
	£898,503	£13,042	£233,043 "A"	£652,418	£861 "B"

The foregoing deals with the subject where the authority supplies in one rating area but the principles are the same where supplies are given in several rating areas. According to Witton Booth ("Rating Valuations of Public Utility Undertakings"), "the term public utility undertaking is one which embraces undertakings serving the needs of the public in many different ways. For the purposes of rating, each undertaking must be considered as one entity, and one only, irrespective of the number of parts there may be which comprise the whole—no matter how widespread may be its tentacles—whether contained within one parish only or extending into many hundreds or even thousands of parishes, each undertaking regarded as a whole has but one net annual value for rating purposes." Also, "as already stated, however, an undertaking as a whole has but one net annual value, so that in the estimation of the separate values for each individual parish, the total of those values taken for the whole of the parishes must not exceed the net annual value of the undertaking as a whole. This is one of the cardinal rules of rating."

Co-operation Between Rating Authorities

Also in a comment on the Central Valuation Committee is the following statement: "The unsatisfactory position as to the valuation of public utility undertakings at the present time has received the careful consideration and investigation of this Committee, and the following resolutions thereon have been passed. These outline the procedure which no doubt will be followed in most counties in the forthcoming revaluations." The resolutions quoted state that many of the main public utility undertakings—gas, water, and electricity—extend into more than one rating area. In a number of cases they extend into more than one county and/or county borough. The Act of 1925 does not require co-operation between the rating authorities concerned, but it is manifest that, unless there is the closest co-operation and agreement, uniformity is unlikely and friction and unnecessary waste of time and money must ensue in settling the value to be attributed to the part of any undertaking in each rating area."

Again, "the cumulo net annual value should then be apportioned among the separate hereditaments comprised in the undertaking in the respective rating areas in such a way that the sum of the individual apportionments is, as nearly as may be, equal to the cumulo net annual value."

Chapter IV of this admirable work deals exclusively with electricity undertakings and the book as a whole gives a most comprehensive interpretation of the various factors relative to rating of public utility undertakings.

In the Courts

Electric Baking Oven Dispute

ON July 26th Mr. Justice Wrottesley concluded in the King's Bench Division the hearing of an action brought by Carealox, Ltd., manufacturers of dog foods, of Romford, Essex, to recover damages for alleged breach of warranty on the sale of an electric oven from the defendants, H. Webb & Co. (Engineers), Ltd., Tottenham, N.

The case for the plaintiffs was that certain representations and warranties were made when an oven and rack were purchased by the plaintiffs from the defendant company for a price of £66 odd. Plaintiffs alleged that contrary to the representations and in breach of warranty the oven did not attain the internal baking heat of 500 deg. F. in three or four hours from cold with a consumption of 7 kWh per hour; that the oven did not maintain a heat of 500 deg. F.; and that it was not capable of satisfactorily letting off steam generated in the process of manufacturing dog foods. Since it was installed, the plaintiffs alleged, it had steadily deteriorated because it required more and more electricity to produce heat. The defects in the oven became apparent when baking on a large scale began. Evidence was given by Mr. Robert Tetley, a solicitor, and his wife, who had promoted Carealox, Ltd.

The defendants pleaded a denial of making the representations and warranties alleged by the plaintiffs. They also disputed that the plaintiff company bought the oven and said it was purchased by Mr. and Mrs. Tetley. There was also a denial that any representations or warranties had been broken and a plea that any made related to the oven without the rack or upper tray in it. It was alleged that Mrs. Tetley wanted the rack fitted so that there could be two bakings at the same time, and although she was warned that the oven was not designed for use with a rack or upper tray she requested that one should be fitted. There was a further plea by the defendant company that if the oven was defective—which was denied—it was due to improper use.

After hearing the evidence, his Lordship gave judgment for plaintiffs for a total of £101 5s. damages with costs.

Unearthed Drill Fatality

The use of an unearthed portable electric drill by which a man received a fatal shock on June 6th, led to a prosecution at Dudley, on July 21st last, when the Valeting and Speedy Laundry, Ltd., Netherton, was summoned for controvening the factory regulations.

Mr. H. W. Atkinson, H.M. Inspector of Factories, said that a man named Albert Evans, chief maintenance fitter at the laundry, was using the drill and at the time there were all the conditions for a serious accident. "There was an unearthed drill, a damp floor, a steel girder, against which the operator was sitting, and the metal casing of the drill was alive with a voltage of 230."

Mr. H. Sutherland, who defended, said that the man had been employed by the firm for fifteen years and his duties included the advising of his employers as to what precautions were necessary for the safety of the workpeople. If anyone should have known the terrible risk that he was taking it was the man himself.

The firm pleaded guilty and the magistrates imposed a fine of £20 with 18s. costs.

Claim and Counterclaim at Chester

Before Judge Whitmore Richards, in Chester County Court, last week, the Chester Corporation claimed certain sums from Mr. R. Rothwell, electrician, for goods supplied. Mr. Rothwell counter-claimed for damages of an unspecified sum, alleging that by virtue of the special position and privileges enjoyed by the plaintiffs in the community they had sought, and were seeking to injure his business so as to make it impossible for him to practise as an electrician on the Chester system, and that the special knowledge of the Council had been used to his detriment.

Mr. Rothwell in answer to the judge stated that he had not had legal advice. The judge said that he did not see that Mr. Rothwell had any cause of action or any defence. It would be much better if he instructed a solicitor. If he had grounds for a counterclaim it would then be properly dealt with.

Rothwell said it would be very expensive for him to engage a solicitor. "Actually, my purpose in defending this case is that through the whole series the final issue in this case is the freedom of the man and the liberty of the people."

The hearing was adjourned until September 12th.

Small Motors and Generators

BRITISH Standard Specification No. 170 has been revised and extended to include generators as well as motors. Motors of the "universal" type are now included, provision is made for short-time rating as well as continuous rating, and recommended horse-powers and speeds are given. One effect of the revision is that motors intended for use with domestic electric refrigerators are now included.

Copies may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

HIRE-PURCHASE SALES

How a Scheme Adopted at Cape Town is Increasing Electricity Consumption

(From a South African Correspondent)

IN 1912 the Cape Town Municipal Electricity Department made its first attempt to popularise the use of electricity for heating and cooking, when an arrangement was introduced for hiring out electric cookers on a monthly rental basis. This scheme, however, was dropped in 1916 and efforts were concentrated on extending the electric transmission and distribution system, so that power could be supplied to all who required it irrespective of location. That work was actively begun in 1920, and up to 1930 the expansion in the sale of electrical energy for domestic purposes, although somewhat irregular, was due to the extent to which the prevailing rates made heating and cooking by electricity more attractive than the less modern methods usually employed.

On September 1st, 1930, however, the Municipal Electricity Supply Department introduced the present scheme of hire purchase, the success of which has far exceeded expectations. When the scheme was put into operation there were only 1,051 electric cookers of 3,500 watts and upwards loading connected to the mains, while electric water-heaters, refrigerators and washers, although offered for sale, were scarcely used at all. During the twelve months ended September 31st, 1931, the first year of operation of the new scheme, the sales of electric cookers exceeded the total number sold up to that time (1,566), while the number sold up to September 31st, 1938, was 18,985. Sales of electric refrigerators up to the latter date numbered 3,037; washing machines, 2,791; and water-heaters, 3,796.

How the System Works

Under the hire-purchase plan adopted domestic electrical appliances are dealt with in two groups: Group A (major appliances), comprising cookers, refrigerators, water-heaters and washing machines; and Group B (minor appliances), made up of cookers, each of which is priced at less than £10 retail, water-heaters with a storage capacity of less than 5 gals., irons, kettles, percolators, wash boilers, and other appliances approved from time to time. Payment for appliances included in Group A, including or excluding the necessary installation work, may be made on the instalment plan as follows: Cookers, washing machines and refrigerators, 36 months; water-heaters, 36 or 49 months. Appliances included in Group B are paid for over a maximum period of twelve months, and the purchase price does not include the cost of any installation work.

Monthly instalments on an electric cooker, inclusive of cost of installation, are determined by adding 15 per cent. to the ordinary retail selling price and dividing the amount into 36 equal parts. Other heavy appliances are sold on a similar basis. The accounts for the monthly instalments on appliances purchased are included with the monthly bills for electricity, and are payable 15 days after the account is rendered. Appliances under hire purchase are maintained in good order free of charge by the Electricity Department throughout the payment period, except for certain limitations in specified instances, such as protective coatings and ball valves for water-heaters. In the case of cash sales, the question of maintenance or servicing is a matter of arrangement between the customer and the dealer. The Department confines itself solely to the hire-purchase scheme.

Rules Governing Purchase

The agreement between the Department and the dealer is as follows:—

(1) Purchases and sales of certain specified appliances are made at retail prices fixed by the dealer and approved by the Department.

(2) The dealer may not sell to the public at a price less than that fixed by him and agreed to by the Commission, except with the written consent of the Commission, provided that with the Department's approval lower prices may be quoted in any particular instance for the sale of three or more major appliances in one transaction.

The Department receives from the dealer a discount of 22½ per cent. off the retail price or the agreed lower price, referred to above, on all its purchases, whether made for resale under the hire-purchase plan or by the Department for cash.

(4) The dealer is not to give terms to any person more favourable than those he extends to the Department, except with its consent.

(5) The Department allows on all sales a discount of 20 per cent. for cash, and the dealer may allow the same discount but not more.

(6) The dealer is not to effect sales on a deferred payment basis of an appliance approved for sale by the Department under hire purchase unless the Department has refused the business.

(7) The dealer guarantees the appliances for the full payment term, and must stock and provide the Department with an adequate supply of spares.

Each dealer is required to provide security of £20 for the fulfilment of his obligations under the contract entered into.

Cooker Sales

The total value of sales in the eight years September 1st, 1930, to August 31st, 1938, was £526,354, and the total load connected amounted to 127,995 kW. Altogether there are now over 25,000 electric cookers in use in Cape Town, including those sold direct by dealers.

Distribution of sales on the basis of the retail selling prices of electric cookers is shown in the following table:—

Retail Price	No. Sold	Per cent. of Total
"Baby" Ranges	181	0.95
£10 to £14	199	1.05
£15 „ £19	3,068	16.16
£20 „ £24	4,857	25.58
£25 „ £29	3,921	20.65
£30 „ £34	3,235	17.04
£35 „ £39	1,552	8.18
£40 „ £44	1,269	6.69
£45 „ £50	504	2.66
£51 upwards	162	0.85
"Heavy duty"	37	0.19
Total	18,985	100.00

The number of appliances sold, together with values, during the first eight years that the scheme has been in operation, is as follows:—

	Sold	Value
Cookers	18,985	£526,354
Refrigerators	3,037	148,302
Water heaters	3,796	69,966
Washers	2,791	95,497
Other large appliances	75	2,609
"Minor" appliances	2,191	4,924
Total	30,875	£847,652

The extent to which the electrical trade in Cape Town has benefited may be judged from the following table showing expenditures in connection with the scheme:—

Appliances purchased	£711,544
Paid as commission for introduction of new business (discontinued in 1933)	4,739
Plugs and switches provided	33,397
Payments to electrical contractors...	155,222
Payments to plumbing contractors	18,436
Total	£923,338

As already mentioned, the primary object of introducing the hire-purchase scheme was to increase the consumption of electricity. In 1929 only 14.9 per cent. of the total sale of electricity was for domestic purposes. In 1938 the percentage rose to over 60, and the volume increased from 8,765,936 to 129,000,000 kWh. This expansion necessitated an increase in plant capacity from 60,000 kW in 1932 to 120,000 kW in 1937, and new plant is now nearing completion which will supply an additional 90,000 kW. At the end of August, 1938, the total number of consumers was 37,728, with an average annual consumption, excluding that for water-heaters, of 4,000 kWh. It is estimated that for an all-electric house, including water-heaters, the annual consumption is 9,000 kWh, which indicates that there are still opportunities for the sale of electrical appliances, although not on the same scale as in the past.

Lightning Stroke Record

THE *Electrical World* reports that a direct stroke of lightning—for the first time—was recently recorded in its entirety, including the initial high-current surge and the long-lasting, low-current tail, by engineers of the Westinghouse Electric & Manufacturing Co. at the top of the 42-storey Cathedral of Learning of the University of Pittsburgh. The full current of this stroke passed through a standard "Autovalve" lightning arrestor with no damage to the arrestor. The engineers stated that this was the first known instance of a lightning arrestor experiencing a direct stroke without injury. The Pittsburgh station is one of several established in the United States in regions of greatest lightning severity. A new automatic surge-recording device of a rotating type, recently developed by Westinghouse, was employed.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

RHYL URBAN DISTRICT COUNCIL has appointed **Mr. E. C. Hall** (acting engineer) to the position of electrical engineer as from April 1st, 1939, at a salary of £400 per annum.

Mr. J. Pilling, B.Sc., A.M.I.E.E., lecturer in electro-technics at Burnley Technical College, has been appointed lecturer in electrical engineering at the University College, Middlesbrough. Mr. Pilling entered Burnley Corporation Electricity Department as a pupil in 1925, going to the power station as improver in 1927. In 1930 he was appointed technical assistant mains inspector. While holding this position he took his B.Sc., with first-class honours at London University. He was formerly part-time lecturer at Burnley College and was then placed in charge of the Electrical Department there. He takes up his new duties in September.

Mr. J. Pilling

The Council of the City and Guilds of London Institute have conferred the distinction of Fellow of the Institute (F.C.G.I.) upon the following gentlemen: Mr. Ll. B. Atkinson, M.I.E.E., Mr. E. Fawssett, M.I.E.E. and Sir Leonard Pearce, C.B.E.

Mr. W. H. Blackford who for the past six years has been employed as sales representative in the Birmingham area for Crompton Parkinson, Ltd., has resigned his position to join the sales staff of Ensign Lamps, Ltd., attached to their Cardiff depot.

Sir Andrew Duncan, chairman of the executive committee of the British Iron and Steel Federation, is joining the board of Imperial Chemical Industries, Ltd. Sir Andrew is a member of the Central Electricity Board, and was chairman from 1927 to 1935.

Mr. G. F. Sinclair, of Wick, has been appointed chief engineer (trams and trolley-buses) of the London Passenger Transport Board in succession to **Mr. A. V. Mason,** who retires under the age limit. Mr. Sinclair has been chief assistant to Mr. Mason since the formation of the board, with the title of rolling stock engineer. Mr. Sinclair was educated at Robert Gordon Technical College, Aberdeen, and gained later experience with Dick, Kerr & Co. His qualities as an expert in tram and trolley-bus design and the engineering problems connected therewith have been recognised by many of the scientific bodies which have connections with the transport industry.

Mr. J. P. Coleman, A.M.I.E.E., well known to many electrical engineers as technical representative of the Foster Engineering Co., Ltd., and who recently resigned his position, has now been appointed director of Gresham Transformers, Ltd., of Hanworth, Middlesex, a new company in which he holds the controlling interest.

Mr. J. P. Coleman

The following scholarships have been awarded by the Institution of Electrical Engineers for 1939: Ferranti scholarship, (annual value £250, tenable for two years), to Mr. A. E. Chester, M.Sc. (Manchester University). Duddell scholarship (annual value £150, tenable for three years), to Mr. D. E. Thomas (St. Clement Danes Grammar School, London). Silvanus Thompson scholarship (annual value £100, plus tuition fees, tenable for two years), to Mr L. E. Ebourne (Cadbury Bros., Ltd., Birmingham). Swan Memorial scholarship (annual value £120, tenable for one year), to Mr. A. M. Davies, B.Sc. (Eng.), (City & Guilds College, London). David Hughes scholarship (value £100, tenable for one year), to Mr. F. Rushton (Manchester College of Technology). Salomons scholarship (value £100, tenable for one year), to Mr. T. E. Calverley (King's College, London). War Thanksgiving Education and Research Fund (No. 1): Grants made as follows: £50 to Mr. R. K. Beattie, M.Sc. (Manchester University); £25 to Mr. P. H. Longman (Queen Mary College, London); and £25 to Mr. G. Y. Shute, B.Sc. (University College, Nottingham). Paul scholarship (annual value £50, tenable for two years), to Mr. D. Nightingale (Stanley Technical Trade School, London). Thorrowgood scholarship (annual value £25, tenable for two years), to Mr. E. Outhwaite (London & North Eastern Railway).

Mr. A. J. Neaves, until recently engaged in public lighting with the British Thomson-Houston Co., Ltd., has accepted an appointment with Crompton Parkinson, Ltd., with whom his activities will be of a similar nature.

Mr. W. A. Gillott, A.M.I.E.E., who for many years past has been in the North has now settled in London and has joined the board of directors of Amberton Electric, Ltd. This company deals in many of the essential requirements of electricity supply undertakings.

Originally on the staff of the North-Eastern Electric Supply Co., Mr. Gillott has held the position of manager of the Domestic and Heating Section of the English Electric Co., Ltd., and commercial manager of British National Electrics, Ltd. He has also been called in to advise many important supply undertakings with regard to cooking and heating developments, and has served on the Council of the E.D.A. A separate company, Gillott Amberton Thermics, Ltd., has been formed and Mr. Gillott has been appointed managing director. The main objects of this company are to develop heating, water-heating and cooking apparatus.

[*Elliott & Fry.*

Mr. W. A. Gillott

Mr. George Malone, head electrician for thirty years with the New Brancepeth Coal Co., Ltd., has retired.

Mr. T. C. Munford, mains superintendent with St. Pancras Borough Council, is retiring after nearly forty-four years' service

Mr. R. Smith, who until a few years ago was closely associated with both the manufacture and sale of "Tricity" cookers, has been appointed sales manager of Tricity Cookers, Ltd., as from August 1st.

Mr. O. Peake, M.P., has resigned from the board of the Yorkshire Electric Power Co., upon his appointment as Under-Secretary of State for the Home Office.

Eastbourne Corporation Electricity Committee has appointed **Mr. S. Eastham,** of Fleetwood, as meter superintendent.

Mr. A. R. H. Jackson has been appointed a director of Erskine, Heap & Co., Ltd. Mr. Jackson received his technical training at Liverpool University and joined the General Electric Co., in 1897. On the formation of Erskine, Heap & Co., Ltd., in 1905, he was appointed chief draughtsman, and has been with the company since that date, rising to the position of chief engineer in 1929.

Mr. A. R. H. Jackson

Mr. H. J. Mulleneux, chief electrical engineer of the Great Indian Peninsula Railway, with headquarters in Bombay, has come to England to meet representatives of the British Government, who are interested in some of his inventions. These inventions, according to him, are chiefly connected with electric railways, but there are some of "national importance" which he wishes to discuss with the authorities of the War Office.

OBITUARY

Mr. John Gray Chrystal, managing director of Spark's Electrical Engineering Works, Aberdeen, died on July 12th.

Signor Carlo Cherasco.—The death occurred in Rome recently, at the age of forty-eight, of Signor Carlo Cherasco, a well-known Italian electrical engineer and the director of the Sindicato Interprovinciale Piemontaise of the Federazione Nazionale Fascista Esercentine Imprese Elettriche.

M. Charles Laurent.—The death occurred recently in Paris of M. Charles Laurent, the founder of the French Syndicat Général de Construction Electrique. He was eighty-four.

COMMERCIAL and INDUSTRIAL NEWS

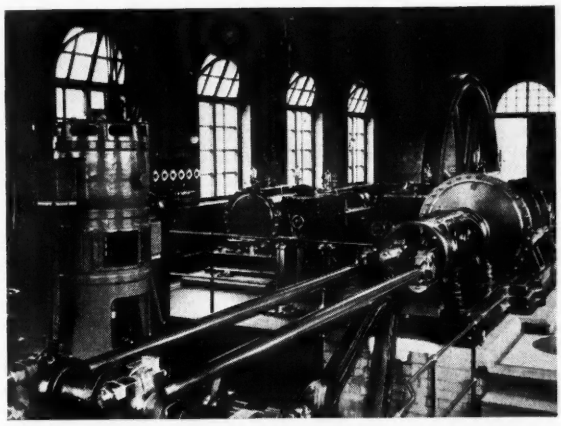
Electric Pumping at Kettering. German Radio Exhibition. A.R.P. in Industry. Motor Production in Australia. Large Ediswan Sign

Electrical Wiring at Rotherham

THE allegation was made last week at a meeting of the Rothernam Trades Council that men engaged in other occupations were, in their spare time, wiring houses under the Rotherham Corporation's wiring scheme. Mr. H. Burkinshaw, who made the assertion, said he knew many apprentices who had completed their training, but were unemployed because these men were doing wiring work. Alderman Ball said he could hardly believe that the report was true. He suggested that they should have the facts before them in order that the matter could be at once taken up.

Electric v. Steam Pumping

Until a few weeks ago, the water pumping station of Kidderminster Borough Council relied entirely upon a stream pump with a capacity of 70,000 gal. per hr. In order to safeguard the supply an electrically driven centrifugal pump with a duty of 63,000 gal. per hr. against a head of 230 ft. has been



A contrast of size between electric and steam pumping plant at the Kidderminster pumping station. The electrical plant on the left has only a very slightly smaller capacity than the steam equipment occupying the remainder of the picture

added. The motor is a 120-HP, 1,260-RPM, 3-phase, slip-ring, vertical machine and is supplied at 400 V from the mains of the S.W. & S. Power Co. The accompanying photograph illustrates the difference in the space required to accommodate the electric and steam pumps. The latter is to be maintained in working order and tests are being carried out to provide a comparison of costs by the two methods.

A.R.P. and Contractors

With a view to preventing danger to rescue and demolition squads from electrical installations that had been damaged in an air raid but left alive, Mr. J. Mortimer Hawkins, managing director of Messrs. Mortimer, Gall & Co., Ltd., has drawn up proposals for enlisting the help of wiring contractors. His suggestions are based upon a zoning of the area of supply into as many sections as there are reliable and *bona fide* contracting organisations, each of which would be wholly responsible for making buildings electrically safe in its area. Where high-voltage mains are involved, these men could stand by and keep the public away or ask the wardens to put guards on whilst they carried out their own work. When mains work was started they could assist the supply undertaking's staff thus expediting repairs. Two hours of instructional classes each week would be given by supply authorities relating to the position of mains, precautions necessary, recognition of different types and sizes of cable, and reading of the network plan and how to assist in cable repairs.

Berlin Radio Exhibition

A *Reuter* message from Berlin states that the first popular television set to be placed on the market in Germany is shown at the Berlin Radio Exhibition, which opened on July 28th. The set—known as E.1—is the joint work of six leading radio firms, and the first models will be delivered in December. It is priced at 650 marks, and is a neat job with equal-sized loud speaker and television screen side by side. The screen is quite flat and a 441-line system is employed.

The wireless receiving sets shown are mainly streamlined models embodying minor improvements on last year's designs. Most of them are also slightly cheaper. On almost every stand there is exhibited the standard "Small Receiver"—a miniature set in a shiny black case—and the "People's Receiver." These were created originally on the orders of General Goering, and are specially designed for the reception of German stations.

In one hall a battery of statistics shows how radio licences in Germany increased by nearly 20 per cent. during last year, making the present total 12,580,000. Over a million and a half were sold last year. The accessories section of the Exhibition displays an officially fostered tendency in Germany to reduce and simplify types. For example, the former total of about 100 types of loud speaker has been reduced to 14, and valves, condensers and other parts have been similarly reduced.

Northants Television Development Association

Leading radio dealers in Northants have formed the Northampton and District Television Development Association with a view to urging on the Government the necessity of television becoming an immediate national service. Officials elected are: Mr. A. Mackenzie (chairman), Mr. H. Orton (vice-chairman), Mr. W. J. A. Parkinson (secretary), and Mr. F. Andrews (treasurer). The Association has communicated with Sir Mervyn Manningham-Buller (M.P. for Northampton), urging the Government to proceed at once with the erection of provincial television transmitters.

F.B.I. Business Barometer

Politics is still the over-riding factor in the world economic situation. In every important country, except America, rearmament is now the mainstay of economic activity and under its influence the volume of business activity should continue to expand for some months to come. This activity, by increasing the general purchasing power, is helping to bring revival in many industries not directly affected by the defence programme, notably the general consumption industries. Nevertheless, the present boom is still very lopsided; while some industries are enjoying a high level of prosperity, others, like private house building, are becoming more depressed. Private investment is practically at a standstill, and the prices of the primary raw materials on the average continue to decline. Another problem which is causing difficulties is the absence of available reserves of skilled labour in certain armament industries, and the fear lest this situation at a time of accelerated armament expenditure may set in train an upward spiral of inflation in both wages and the prices of finished goods. This is specially important from the point of view of our export trade and balance of international payments. Should the increase in the defence programme lead to a further expansion of our imports, then it will not be easy to prevent our balance of trade from becoming still more unfavourable.

Electric Drive for a Gravel Pump

An unusual application for an electric motor is shown in the accompanying picture. It is to obtain gravel from a pit which is permanently flooded. The motor, complete with centrifugal pump, is mounted on a floating pontoon in the pit. It is a 50-HP, 750-RPM Higgs motor and is direct-coupled to a Blackstone unchokeable pump specially designed for pumping gravel. The suction lift is 10 ft. and delivery 15 ft. along

Blackstone gravel pump driven by a Higgs motor

45 ft. of 5-in. piping. The pump delivers 900 gal. per minute of mixture containing 10 per cent. of solids. The suction lift increases to about 18 ft. as the level of the gravel in the floor of the pit is lowered and delivery with this lift is about 750 gal. per minute. The floor of the pit is kept more or less level by moving the complete pumping equipment on its

floating pontoon. This installation was carried out by Messrs. H. Noble, of Norwich, for Thorpe Gravel Pits, Norwich.

A.R.P. in Industry

A pamphlet, "A.R.P. in Industry," explaining the Civil Defence Act has been prepared by the Lord Privy Seal's Department for the guidance of owners and occupiers of industrial and commercial establishments. It is a revised and amplified description of the Act, replacing the pamphlet bearing the same title which was issued at the time this measure was introduced into Parliament. The Act lays important obligations on owners and occupiers of commercial establishments in vulnerable areas specified in the Act where more than fifty people are employed, and creates other obligations with regard to such establishments where more than thirty people are employed in any part of the country. The leaflet is therefore of great importance to the majority of employers of labour. The new pamphlet may be obtained, free of charge, on application to the Publicity Section, A.R.P. Department, Horseferry House, Thorney Street, S.W.1.

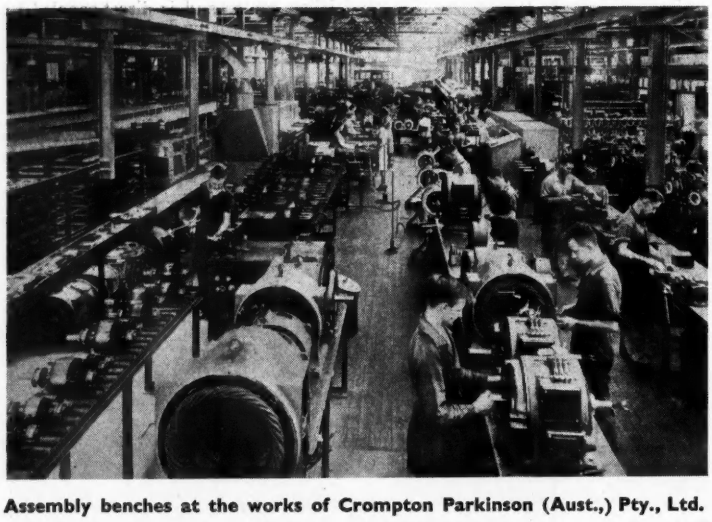
In Government stores 700,000 steel helmets are waiting for issue to members of A.R.P. squads in industrial and commercial establishments but few orders are coming in for them. The Civil Defence Act lays on all who employ more than thirty persons in any factory premises, mine, or commercial establishment, anywhere in the country, the obligation not only to see that all their employees know what they should do in the event of an air raid, but to ensure that a proportion are trained and equipped in A.R.P. measures. The members of these squads will require steel helmets. Arrangements have been made by the Government, through a Joint Committee of employers representing all sections of industry, for the supply of helmets, and order forms have been made available for the purpose. Firms who are not members of any trade association can obtain them by applying direct to the Finance Office, Home Office, Whitehall, London, S.W.1. The helmets cost 8s. 6d. each, and the cost is deductible as an expense from trading profits for income-tax purposes. Seven sizes, corresponding with the ordinary hat sizes, will be available, and the numbers necessary can be ascertained from the pamphlet "Preliminary Memorandum on the Organisation of Air Raid Precautions Services in Industrial Undertakings," published by the Stationery Office, price 3d. The Civil Defence Act became law on July 13th, and is now of course in full force. The Air Raid Precautions Department is anxious to receive orders for steel helmets at the earliest possible moment in order that employers may at once carry out their obligations under the Act.

Wireless Beacon at Longstone

Marconi's Wireless Telegraph Co., Ltd., has received an order from Trinity House to install automatic marine wireless beacons, for the safeguarding of navigation, at Longstone Lighthouse in the Farne Islands and on the Outer Gabbard Light Vessel. The Longstone Lighthouse is of historical interest as this was the home of Grace Darling. The call sign of this beacon is MGD.

E.C.A. Conference Paper

The five-part paper presented at this year's E.C.A. conference was a useful guide to some important aspects of modern installation work and there has naturally been a great demand for copies. It is being reprinted and *bona fide* applicants will be able to obtain a copy from the Director, E.C.A., Africa House, Kingsway, W.C.2.



Assembly benches at the works of Crompton Parkinson (Aust.), Pty., Ltd.

Annual Holidays

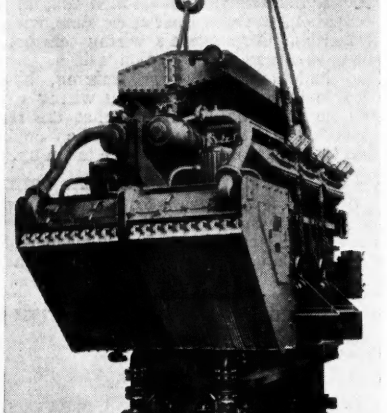
Wm. Sanders & Co. (Wednesbury), Ltd., are closing their works from August 4th to 14th for the annual holidays.

The Woolwich works of Siemens Bros. & Co., Ltd., will be closed from August 5th to 12th.

Kryn & Lahy (1928), Ltd., and J. Browett Lindley (1931), Ltd., will close their works for the holidays from August 4th to 14th. The offices will be closed from August 4th-8th.

Emergency Electrical Plant

A transformer which has been completed for the Central Electricity Board under the national scheme for emergency electrical plant is the type O.F.B. unit shown in the accompanying illustration. Manufactured by the Hackbridge Electric Construction Co., Ltd., to conform to special requirements, the rapid completion of this unit represents no small achievement. It is a 20,000-kVA, three-phase, 33,000/11,000-V transformer, with a full load tapping for 6,600 V. Cooling is by a special Serck pattern cooler mounted on one end of the transformer, the pumps providing forced circulation of oil through the radiators; the motors of the forced draught fans are clearly visible in the illustration. A 30-kVA auxiliary transformer, ratio 6,600/400 V, can be seen mounted on the farther end of the main tank. The supply from this transformer is used for driving the fan and pump motors and other auxiliary services in the sub-station.



A Hackbridge emergency spare transformer completed for the C.E.B.

Each unit, complete with cooler auxiliary transformer, conservator and all other fittings in place, can be transported over any railway track in Great Britain where the standard loading gauge is in force, and it can thus be brought into service in the minimum possible time.

Other mobile units constructed for the C.E.B. include a further four identical units, and three very similar but with the low-voltage side arranged for 22 kV or 11 kV by means of series parallel connections. Three 15,000-kVA units with a voltage ratio of 6.6/5.8/5.35 kV are in course of completion.

Crompton Parkinson in Australia

The growth of many concerns in Australia has often been even more rapid—if not as extensive—as that of their parent companies in the British Isles. Crompton Parkinson (Aust.) Pty., Ltd., provides an interesting example of this. This factory was opened in 1921 following a tour of Australia by Mr. Frank Parkinson, director of Crompton Parkinson, Ltd., who, recognising the potentialities of Australia, also realised that it would inevitably become self-contained and independent of other countries for its supplies of electrical equipment.

Production started in the original factory with a limited range of standard three-phase induction motors capable of meeting the requirements of small industrial undertakings. Since then the range of motors manufactured at Five Dock has been rapidly increased, and to-day it virtually covers all requirements from ¾ to 125 HP.

As recently as 1937 further large extensions were carried out and experts from England installed the most modern machine tools procurable and instituted production methods similar to those at the Guiseley Works. An example of the precision with which all operations are performed is the dynamic balancing of rotors for all motors intended for machine tools or other drives where out of balance can seriously impair the quality of work performed by the driven unit. All the operators in the Five Dock factory have been trained for years in their particular job. A great many of them are taken into the works as soon as they leave school and are taught the intricacies of winding by progressive stages.

After final assembly each motor is given every test to prove its suitability for the service for which it is intended. A number of routine tests are carried out on the flow system. By this method it is possible to give motors a very much more exhaustive test than would otherwise be possible. In addition, the Five Dock testing department conducts a number of very exacting tests on individual motors.

Development in the motor department has not been confined to three-phase induction motors. With the growth in demand

for single-phase fractional HP motors, production of the "Minor" motor was commenced in 1932 and a section of the factory, laid out specifically for the purpose, is capable of producing 250 of these small motors every week. This output, however, has proved insufficient and a new factory has been erected, which will be capable of supplying the entire requirements of the Commonwealth from ⅛ to ¾ HP, both in quantity and range. Repulsion, induction, capacitor, split-phase and three-phase "Minors" are produced in a range of HP, speeds and enclosures to meet all requirements.

Electric Vehicles in Germany

A survey of electric vehicles in Germany shows that altogether there are 9,000, including 2,000 used by municipal authorities for street cleaning, but excluding small vehicles used inside large factories; these actually total 13,000. There are only a few trolley-buses in service in Germany. Consumption of electricity is estimated at 160 million kWh per year. At the moment the principal uses to which electric vehicles are put include the postal service, urban services, food transport in cities and vehicles used by both electric and gas companies. Parts are being standardised, including the size of accumulators. Throughout Germany there are no more than ten trolley-bus routes and forty vehicles; two routes are in Berlin.

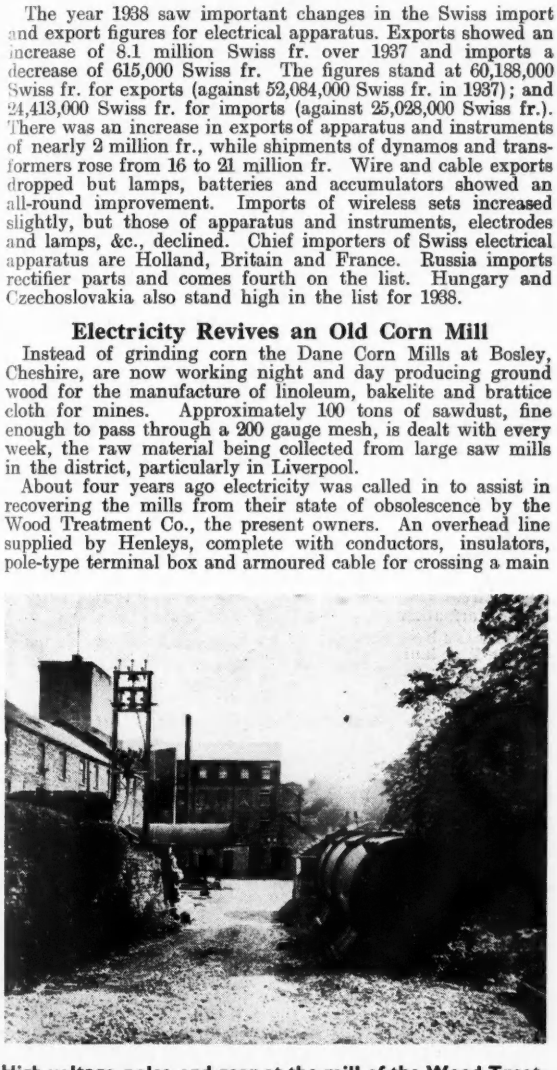
Swiss Foreign Trade

The year 1938 saw important changes in the Swiss import and export figures for electrical apparatus. Exports showed an increase of 8.1 million Swiss fr. over 1937 and imports a decrease of 615,000 Swiss fr. The figures stand at 60,188,000 Swiss fr. for exports (against 52,084,000 Swiss fr. in 1937); and 24,413,000 Swiss fr. for imports (against 25,028,000 Swiss fr.). There was an increase in exports of apparatus and instruments of nearly 2 million fr., while shipments of dynamos and transformers rose from 16 to 21 million fr. Wire and cable exports dropped but lamps, batteries and accumulators showed an all-round improvement. Imports of wireless sets increased slightly, but those of apparatus and instruments, electrodes and lamps, &c., declined. Chief importers of Swiss electrical apparatus are Holland, Britain and France. Russia imports rectifier parts and comes fourth on the list. Hungary and Czechoslovakia also stand high in the list for 1938.

Electricity Revives an Old Corn Mill

Instead of grinding corn the Dane Corn Mills at Bosley, Cheshire, are now working night and day producing ground wood for the manufacture of linoleum, bakelite and brattice cloth for mines. Approximately 100 tons of sawdust, fine enough to pass through a 200 gauge mesh, is dealt with every week, the raw material being collected from large saw mills in the district, particularly in Liverpool.

About four years ago electricity was called in to assist in recovering the mills from their state of obsolescence by the Wood Treatment Co., the present owners. An overhead line supplied by Henleys, complete with conductors, insulators, pole-type terminal box and armoured cable for crossing a main



High-voltage poles and gear at the mill of the Wood Treatment Co., Bosley, Cheshire

road, was installed to carry a supply to the mills from a 110-BHP water turbine some distance down the nearby river. As water for the turbine is inconsistent during dry weather, a Crompton Parkinson motor of 300 BHP at 400 V, 50 cycles AC, taking a supply from the Electricity Co. of Macclesfield, Ltd., has recently been installed to drive the main shafting as an alternative to the water turbine and the power generated by a Diesel engine power unit of 230 BHP. For the new connections Henley paper-insulated cables were installed, in conjunction with Henley cold filling compound. In addition, a 270-BHP water turbine installed at the mill is coupled to a DC generator to supply the small motors and lighting.

Thermostatic alarm indicators are fitted to the bearings of the machines, as a hot bearing due to friction might easily cause the free wood dust in the mills to ignite. Henley metallic flexible armoured cable has been used for making connections, and the bearing caps have been tapped to suit Henley glands. Our picture shows the high-voltage poles and gear; the transformer can just be seen at the foot of the pole and at the end of the wall. The incoming line enters on the left, passes underground and thence through a passage to the main road, whence it again runs underground to another "H" pole and thence across country. The low-voltage line from the transformer runs underground across the yard and enters the mill building, connecting to the supply company's switchgear. From this position the mill motor cables are taken, and an arrangement is also made whereby the supply company can take a low-voltage main from the switchgear to feed the nearby cottage property for lighting.

Oil Engine Contracts

Crossley Brothers, Ltd., have a number of contracts in hand, including an order for two four-cylinder vertical scavenge-pump Diesel engines, totalling 220 BHP, direct coupled to generators, for lighting purposes at Manchester Ship Canal, Eastham Locks. The company is also supplying a 510-HP six-cylinder vertical Diesel engine for Tanganyika Central Gold Mines, two five-cylinder pressure-charged Diesel engines, totalling 660 BHP, for Downs Dairies, Australia, and two five-cylinder vertical Diesel engines, totalling 1,000 BHP, for Kalabagh Head Works, Punjab.

Rubber Handbook

The 1939 edition of "Rubber Producing Companies" is now obtainable from the *Financial Times*, 72, Coleman Street, E.C.2, and the Mincing Lane Tea and Rubber Share Brokers Association, Plantation House, E.C.3 (price 7s. 6d.).

I.E.E. Students Visit France

A party of fifty I.E.E. students left last Saturday for a trip to France to inspect hydro-electric developments in the Lyons district.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price August 2nd	Fortnight's inc. or dec.
a Acid oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£37	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax... ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19	—
a Potash Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate... ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 8s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium, Bichromate, casks ... per lb.	4¼d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£94	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£197	—
Grade II ... ... ,,	£137	—
Grade III ... ... ,,	£73	—
c Brass (rolled metal 2" to 12" basis)... per lb.	8¼d.	—
c ,, Tubes (solid drawn) ... ... ,,	11½d. to 11¾d.	—
c ,, Wire, basis ... ... ,,	8¾d.	—
c Copper Tubes (solid drawn) ... ,,	1/0¾d.	—
g ,, Bars (best selected) ... per ton	£80	—
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£49 15s.	5s. inc.
d ,, ,, Wire Rods ... ,,	£54 5s.	5s. inc.
d ,, ,, H.C. Wire ... per lb.	8d.	—
f Ebonite Rod ¼" dia. & up ... ... ,,	1/10 to 2/3	—
f ,, Sheet ⅛" thick & up ... ,,	1/4 to 1/8	—
n German Silver Wire, Nos. 1 to 12... ,,	2/4	—
h Gutta-percha, fine ... ... ,,	Nom.	—
h India-rubber, Para-fine ... ... ,,	7¾d.	¼d. inc.
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 15s.	—
i ,, Wire galv. No. 1 P.O. Qual.... ,,	£23	—
g Lead, English Pig ... ... ,,	£17 5s.	5s. inc.
g Mercury ... ... per bot.	£16 10s.	—
e Mica (in original cases) small ... per lb.	1/– to 2/6	—
e ,, ,, ,, medium ... ,,	7/6 to 15/–	—
e ,, ,, ,, large ... ,,	17/6 to 22/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/1	—
p ,, ,, rolled strip & sheet ,,	1/1½	—
p ,, ,, wire ... ... ,,	1/1½	—
o Platinum ... ... per oz.	£7 10s.	—
d Silicium Bronze Wire ... ... per lb.	8¾d.	—
g Spelter ... ... per ton	£14 11s. 3d.	5s. inc.
g Tin, Block (English) ... ... ,,	£230	—
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/9	—

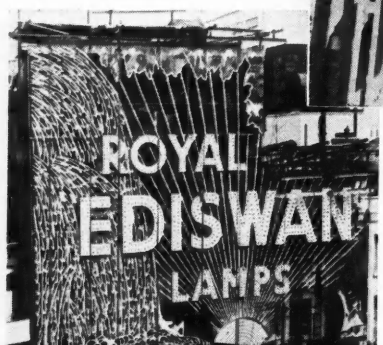
Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

A Large London Sign

Two thousand square feet of spectacular brilliance will, within a few days, blaze across Leicester Square to provide one of the world's largest animated neon signs. 6,000 ft. of "Francora" fluorescent tubing, operating from 250 transformers and nearly 1,000 "Royal Ediswan" lamps, have been combined to produce a fully animated display. The cascade of water, the rising sun, the massive expanding lamp, and the fine flashing colour effects of the lettering will present an impressive spectacle. The steady control of the output of the neon tubes to produce the effect of falling water at first presented something of a problem, but the difficulty was overcome by designing a novel type of controller which is being patented. It consists of special chokes mounted on the inner periphery of a non-ferrous metal ring, each choke being connected to a line of tubes on the cascade. The centre of the controller has a revolving pole-piece of laminated iron which, passing successively across the ends of the chokes, sets up a reactance resulting in the smooth dimming of the tubes. In addition to this smoothness of control there is no radio interference due to sparking. It is interesting to note that this enormous sign was hauled into position in complete sections. All tubes and lamps were fitted to the large angle frames and grilles at the works so that very little connection of the sign itself was required on the site. This sign advertising "Royal Ediswan" lamps is being erected for the Edison Swan Electric Co., Ltd., by Franco Signs, Ltd.



The new Ediswan sign in Leicester Square, and (above) a workman fixing one of the huge letters

C. A. Parsons & Co.'s Jubilee

The summer number of the "Heaton Works Journal," of C. A. Parsons & Co., Ltd., appears at the fiftieth anniversary of the company's foundation, and naturally special prominence is given to the achievements of the late Sir Charles Parsons. Few eminent men can have had so many and such varied interests. Reference is made to some of his lesser known work and personal reminiscences, and a foreword is contributed by Mr. F. G. H. Bedford, the present chairman and managing director.

A.C.E. Utilities

As we stated in our "Financial Section," the winding-up order made against Architectural Constructional and Electrical Utilities, Ltd., 93, Park Lane, W.1 (reported in our last issue), was rescinded on the same day. Mr. P. King-Morgan, technical director, informs us that it is proposed to reconstruct the company. The present nominal capital is £15,000, and the proposed reconstruction aims at increasing it to £65,000 and providing a further £20,000 working capital to enable the company to purchase and work certain patents of Mr. King-Morgan's which have been developed during the past eighteen months. These include a new range of industrial lighting reflectors made from material which are highly resistant to corrosion and has high reflective properties in either specular or diffused finishes.

New Catalogues and Lists

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A 78-page catalogue of electrical equipment for the aircraft industry.

Cressall Manufacturing Co., Ltd., 31, Tower Street, Birmingham, 19.—A leaflet dealing with motor-operated regulators.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, London, E.C.1.—Catalogue No. UL.1 describing overhead service accessories.

National Gas & Oil Engine Co., Ltd., Ashton-under-Lyne.—A pamphlet describing series "RA" heavy oil engines.

Matthew & Yates, Ltd., Swinton, Manchester.—An illustrated art catalogue of propeller fans containing much useful technical information.

Baxendale & Co., Ltd., Miller Street Works, Manchester.—A 112-page illustrated pocket-size catalogue of electric light and power accessories.

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, London, E.C.4.—An illustrated technical booklet dealing with propeller fans.

Pressed Steel Co. of Great Britain, Cowley, Oxford.—A booklet giving the technical story of "Prestcold" refrigerators.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

SAFTIBASE bowl fire.
NEW ERA lamp.
GLOCOAL or GLOWCOAL fire.
LINK washer.
WRATTEN lighting fittings.
CIVIC adjustable bracket.

Parliamentary News

(BY OUR SPECIAL REPORTER)

Isolated Consumers

IN the House of Commons on July 26th Mr. Bartlett asked the Minister of Transport whether, without new legislation, he would take steps to assure that isolated consumers of electricity who made a capital contribution in order to obtain a supply should receive a refund if other persons in the vicinity subsequently took advantage of their initiative and themselves became consumers.

Captain Wallace said it was not possible without new legislation to ensure that isolated consumers of electricity should receive refunds in the circumstances referred to, but he was always prepared to ask the Electricity Commissioners, in suitable cases, to endeavour to arrange some adjustment.

X-ray Apparatus

On July 27th Mr. Hopkin asked the Minister of Health if he was aware that a portion of a large number of X-ray units for civil hospitals in time of emergency now being constructed for, or on behalf of, the Ministry of Health, were being fitted with X-ray tubes of British manufacture and a greater portion with foreign X-ray tubes, although British tubes were available and efficient; and would he recommend that only British X-ray tubes be employed.

Mr. Elliott said that the majority of the tubes for mobile X-ray apparatus ordered for the emergency hospitals were to be British and the remainder American. The orders were placed with the British X-ray Engineers' Association and allocated by them to all the firms in the industry in this country. In the present state of the industry it would not be practicable to insist upon the exclusive use of British tubes.

Wire Broadcasting

Sir M. Sueter asked the Postmaster-General on July 27th whether the system of wire broadcasting by electric mains was being investigated fully by the technical officers in his department to ascertain if the technical difficulties could be overcome to enable this system to be put into operation on many power cable networks in this country.

Major Tryon said that proposals for the distribution of broadcast programmes by means of electricity supply lines were under consideration by his Department in consultation with the Ministry of Transport and the Electricity Commissioners. A meeting was to be held this week with representatives of the electricity supply associations at which the technical and other aspects of the scheme would be discussed.

Television

Mr. Graham White asked the Postmaster-General if he was now in a position to make a further statement with regard to the extension of television services to the provincial centres.

Major Tryon said that he was in communication with the Treasury concerning the question of extending the television service to the provinces, but he was not yet in a position to announce a decision.

ELECTRICITY SUPPLY

New Power Station at Poplar? the Fixed Price Light Co. Higher Charges in Central London. L.C.C. and Reduced Transmission Costs in North Wales

Carlisle.—NEW SUB-STATIONS.—The Corporation is to erect sub-stations in Richardson Road, and on the Knowefield estate.

Cheltenham.—PROPOSED SUB-STATION.—At a cost of £1,624 the Electricity Committee is to build a sub-station in Rowanfield Road.

Coventry.—A.R.P.—Air raid precaution works costing £1,513 are to be carried out by the Electricity Committee.

A decontamination squad at work at the Hams Hall power station, Birmingham, on the occasion of the visit of the Electric Supply Committee and senior officers of the electricity undertaking to the station

Eastbourne.—SYSTEM IMPROVEMENTS.—Among works which the Electricity Committee proposes to carry out are the alteration of the main switches and the installation of a bus-section switch, at an estimated cost of £1,676. An expenditure of £4,436 is to be incurred on altering the position of outdoor transformers and constructing bays. Replacement of mains will cost £1,440 and the laying of a feeder between the St. John's Road and Granville Road sub-stations £657. A sum of £503 is to be spent on installing an additional transformer and switchgear at the Coppice Avenue sub-station.

Gateshead.—SUB-STATION.—The North-Eastern Electric Supply Co., Ltd., is to build a sub-station in Flexbury Avenue.

Hastings.—DISTRIBUTION WORKS.—It is proposed to carry out mains and sub-station extensions at an estimated cost of £30,690.

Herne Bay.—PROPOSED SUB-STATION.—Plans have been passed for a transformer sub-station at St. Louis Grove, for the Herne Bay and District Electricity Supply Co., Ltd.

Inverness.—PARTIAL BULK SUPPLY.—Negotiations with the Grampian Electricity Supply Co. for a partial bulk supply are being hurried through as the Council's plant may prove insufficient to meet the demands this winter. A draft agreement is now under consideration.

Ivybridge.—SUPPLY EXTENSIONS.—It was decided at a meeting of the Plympton Rural District Council last week that application should be made for permission to borrow £10,708 for an extension of the undertaking to Ivybridge, by way of Yealmpton, Holbeton and Ermington.

Johnstone.—CHANGE FROM GAS TO ELECTRICITY.—The Town Council has recently approved a proposal for lighting the main streets of the town by electricity in place of the existing gas installation. Tenders are to be invited shortly for the work and the Town Council has appointed Mr. James Orr, consulting engineer, to advise on the scheme. The system will be in operation for the coming lighting season.

LONDON.—HACKNEY.—The A.R.P. Committee is to install electric lighting in trenches at a cost of £987. A plan has also been prepared by the Electricity Committee for air raid precautions at the electricity works at a cost of £21,000.

SUGGESTED POWER STATION SITE.—Reporting on the South-east England Electricity Scheme which provides for five new generating stations, the Electricity Committee states that it has made representations for one of these stations to be erected on a site which the Port of London Authority is prepared to sell to the Council. The site comprises 16 acres, has a frontage to the River Thames, and is in every respect eminently suitable for a large modern power station. If the Central Electricity Board is prepared to consider the erection of a station on this site it will be necessary for a detailed report to be prepared and the Committee proposes that Mr. John Bruce, consulting engineer, should be engaged for this work at a fee of 1,000 guineas. In the event of the C.E.B. adopting the proposal Mr. Bruce would be retained as consulting engineer for the new station and he would, in conjunction with the borough electrical engineer, prepare the scheme for presentation to the Board.

SUB-STATION EQUIPMENT.—The Poplar Electricity Committee proposes to install automatic equipment at the Glengall Grove sub-station at a cost of £2,000.

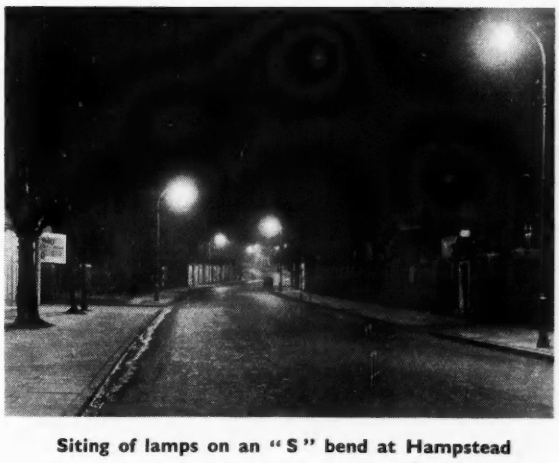
It also recommends the erection of a sub-station in Morris Road by direct labour at a cost of £1,530, and the provision of an additional sub-station in the Bromley district.

STEPNEY.—Application is to be made for sanction to a loan of £50,000 in connection with the change over to AC.

INCREASED CHARGES IN CENTRAL LONDON.—Considerable increases in the fixed charge of the domestic two-part tariff, amounting to up to 60 per cent., are being made by Central London Electricity, Ltd. The increases are heaviest in the case of small premises, except in a new section "up to 750 sq. ft." for which the charge is 15s. compared with 12s. 6d. under the old scale. Other charges are as follows, with the previous rate in brackets: 750-1,000 sq. ft., £1 (12s. 6d.); 1,000-1,250 sq. ft., £1 5s. (15s.); 1,250-1,500 sq. ft., £1 10s. (18s. 9d.); 1,500-2,000 sq. ft., £2 (£1 6s. 3d.); 2,000-2,500 sq. ft., £2 8s. (£1 12s. 6d.); with increases of about fifty per cent. for large premises. The increased charges will be subject to the surcharge of 7½ per cent. imposed a few months ago, as will the running charge which remains at ½d. per kWh.

FULHAM.—A complete new tariff, designed to simplify the existing multiplicity of charges, is to be introduced by the Fulham Electricity Committee on December 1st. Eleven tariffs are withdrawn and the Committee recommends the following new scales: Two-part tariff, with running charge of 0.4d. per kWh: Domestic premises: Minimum standing charge 10s. per quarter up to 600 sq. ft. of floor area. Free wiring for cooker, 1½ gallon water heater (or wash boiler in lieu of water heater) and iron up to 30 feet per point, where a cooker is installed. Shops, business premises and cinemas: £9 per annum per kVA of maximum demand. Factories: £4 per annum per kVA of maximum demand. Night supplies: Between 11 p.m. and 7 a.m., 0.33d., per kWh, subject to coal clause. The existing lighting flat rates are to be retained, subject to elimination of discounts in certain cases, but the flat rate for heating and power is to be increased from ½d. to 1d. per kWh. The Council is asked to authorise an expenditure not exceeding £25,000 on the modification of meters to suit the new tariff.

STREET LIGHTING AT HAMPSTEAD.—Many of the most important thoroughfares in the borough are included in a street lighting improvement scheme recently carried out by the General Electric Co., Ltd. More than 100 units incorporating 750-W tungsten filament lamps in large G.E.C. "Oxford" lanterns have been installed. The columns are all steel and are of the "shepherd's crook" type, the bracket projecting about 6 ft. The installation provides an even distribution of



Siting of lamps on an "S" bend at Hampstead

high-intensity lighting, and the contract was carried out to the requirements of the borough electrical engineer and manager, Mr. H. Brierley. Standard practice is to place units only on the outside of a bend, and the problem on an "S" bend is to decide where to change from one side of the road to the other. A scientific method of siting, invented by Mr. J. M. Waldram, of the G.E.C. research laboratories at Wembley, was used to decide on lamp positions in this instance. This gauge, which deals primarily with lamp siting in the optimum position, greatly simplifies the checking of a lay-out.

ST. PANCRAS.—The Electricity Committee is to extend mains at a cost of £1,283. Nearly £3,000 is to be spent on air raid precautions and the mains department is to be extended at a cost of £10,500.

To comply with the requirements of the Home Office regarding the restriction of street lighting in an emergency the chief electrical engineer at St. Pancras reports that it will be necessary to incur an expenditure of £3,237.

SOUTHWARK.—Some tenants on the London County Council's Webber Row estate are served by the Fixed Price Light Co., Ltd., under an agreement between the County Council and the company made in 1930. The L.C.C. Housing Committee has now recommended that the agreement with the company should be terminated, the existing installations dismantled, all the dwellings wired or rewired, and a new arrangement entered into with a public supply authority for the necessary services subject to a payment by the Council of £1 a flat as a contribution towards the cost of the rising mains. Including this payment, the total estimated cost for the 229 dwellings is £2,070. The tenants will be required to pay a small charge of from 2d. to 4d. a week in respect of the cost of the installation.

STOKE NEWINGTON.—The Electricity Committee is to complete the extra-high-voltage ring main at a cost of £970.

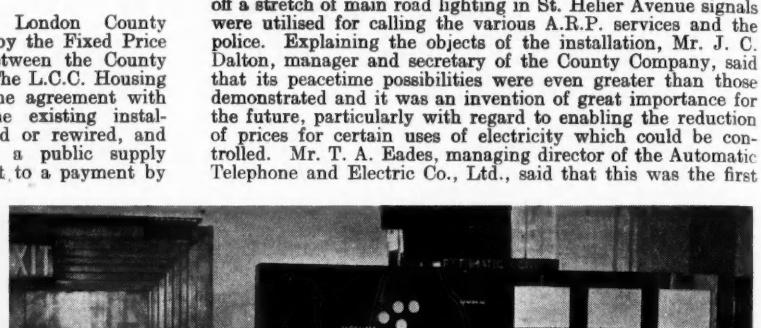
Lossiemouth (Morayshire).—POWER STATION EXTENSION REFUSED.—The application of the Town Council for consent to the extension of the generating station has been refused. The Electricity Commissioners state that after consideration of evidence given at the recent inquiry, they have come to the conclusion that a case has not been made out for installation of additional plant, as compared with the alternative of a supply in bulk from the Grampian Electricity Supply Co. The Commissioners are satisfied that a supply in bulk would be in the best interests of the Corporation's undertaking.

Luton.—SCHOOL LIGHTING.—The Education Committee is to have electric lighting installed in Hitchin Road Junior and Infants' School.

Manchester.—POWER STATION EXTENSIONS.—The City Council has approved a scheme for the extension of the Stuart Street power station. The total expenditure is £892,000. New plant is to be installed as follows: Two 30,000-kW turbo-generators, each with a 750-kW house-service generator, also condensing plant; four boilers of 130,000 lb. per hour evaporation, with economisers, stokers, &c.; two boilers to be converted from 200 to 375 lb. per sq. in. steam pressure; new high-pressure steam pipework and boiler feed-water pumps; and extensions of coal conveying and ash removal plant. Three new 40,000-kVA transformers are to be installed together with four 6,600-V 750,000-kVA rupturing capacity switch units; five 33,000-V 750,000-kVA switch units, and eleven 6,600-V 500,000-kVA feeder units, also automatic voltage regulating equipment. Application has been made to the Commissioners for borrowing powers to cover the work.

INQUIRY INTO COAL PRICES AND SUPPLIES.—A complaint by the Corporation regarding supplies of coal for its electricity undertaking was the subject of an inquiry opened on Tuesday by the Lancashire and Cheshire District Committee of Investigation. Mr. P. B. Dingle (Deputy Town Clerk) quoted figures showing that since 1935 offers from Lancashire Associated Collieries had increased by between 6s. and 6s. 6d. a ton. In October the Corporation advertised for 650,000 tons of coal and subsequently obtained tenders for 538,570 tons, but only 254,800 tons (approximately 50,000 tons less than was obtained from them in the previous years) was offered by Lancashire Associated Collieries. He argued that the executive board had failed to fix minimum prices for coal as required by the scheme, but that these and the quantities it was decided to offer to the Corporation were fixed by a "peculiar committee" known as the Gas and Electricity Committee which met at Sheffield. Mr. Dingle further alleged that this committee had discriminated against the undertaking, and that the Corporation had been deprived of the benefit which it calculated to receive by placing the Barton station near the coalfield. In cross-examination by Mr. Wingate-Saul, Mr. C. H. Lamb, chief engineer and manager of the electricity undertaking, admitted that the L.A.C. had not refused to supply more than the 254,800 tons offered. The complaint about having lost "geographical position" at Barton applied to only half the coal supplied. Mr. Wingate-Saul submitted that as a result of the co-ordination of prices on a "delivered" basis it was inevitable that consumers must lose the advantage of their geographical position. The Gas and Electricity Committee referred to was a sub-committee of the standing committee for the co-ordination of prices. He contended that the directions of the Central Council had been complied with and if there were any complaint it should be made to the National Committee of Investigation. The inquiry was adjourned.

Morden.—"RYTHMATIC" CONTROL SYSTEM INAUGURATED.—A "Rythmatic" centralised control system installed by the Automatic Telephone & Electric Co., Ltd., was officially inaugurated last Friday by Sir Cyril Hurcomb, chairman of the Electricity Commission. The installation has been erected in the County of London Electric Supply Co.'s sub-station at Beddington, but to demonstrate its operation a special control board was set up at the Rose Hotel. Six district signals are provided for by the equipment and besides switching on and off a stretch of main road lighting in St. Helier Avenue signals were utilised for calling the various A.R.P. services and the police. Explaining the objects of the installation, Mr. J. C. Dalton, manager and secretary of the County Company, said that its peacetime possibilities were even greater than those demonstrated and it was an invention of great importance for the future, particularly with regard to enabling the reduction of prices for certain uses of electricity which could be controlled. Mr. T. A. Eades, managing director of the Automatic Telephone and Electric Co., Ltd., said that this was the first installation in which the nation's defence requirements had figured so prominently. The development of the system would have come anyway, but it had been expedited by international affairs. The ceremony was presided over by Sir Thomas Bethell, a director of the County Company.



Inauguration of "Rythmatic" control system at Morden showing (left to right) Viscount Hinchinbrooke; Mr. T. A. Eades (managing director of the Automatic Telephone and Electric Co.), speaking; Sir Cyril Hurcomb (chairman of the Electricity Commission); Sir Thomas Bethell; Mr. C. J. Brand (director of the County of London Electric Supply Co.), and Mr. J. C. Dalton (manager and secretary, County Co.).

North-West Midlands.—SEEKING A NEW SITE FOR POWER STATION.—A comprehensive survey is being undertaken by the J.E.A. in order to discover a suitable alternative site for the proposed power station, following the rejection by the Electricity Commissioners of the scheme for the erection of the station at Barlaston. A site known as Newstead on the Trentham-Longton road is at present under consideration.

North Wales.—LOWER TRANSMISSION COSTS.—As a result of negotiations between the North Wales and the South Cheshire Joint Electricity Authority and the C.E.B. the latter has granted a concession which will bring about a reduction in transmission costs to the bulk supply takers, a relief for which they have been agitating for many years. It was stated at Bangor City Council last week that the reduction must be utilised not for the relief of rates by local undertakings but for the benefit of the consumers, in order to develop further the use of electricity in the area.

Portsmouth.—EMERGENCY LIGHTING.—The Assistance Committee is to install emergency lighting in the Institution at a cost of £2,000.

Ramsgate.—PURCHASE OF UNDERTAKING DISCUSSED.—Town Council has referred back to a specially formed committee the recommendation of a sub-committee that "it would not be in the interests of the ratepayers, or of the users of electricity, that the Corporation should at the present time seek to exercise its powers to purchase the electricity undertaking.

South-West Midlands.—REPORT OF ADVISORY COMMITTEE.—Reviewing the general progress made during the past year the joint annual report of the Corporation of Birmingham and the S.W. & S. Electric Power Co., submitted through the South-West Midlands Advisory Joint Committee, states that the disturbed condition of trade due to the international situation adversely affected the industrial areas. The active development measures adopted by authorised undertakings in the domestic sphere, however, assisted in counteracting in some measure the unfavourable trade position. The following facts give a broad indication of the progress of electricity supply during 1938-39 within the S.W. Midlands Electricity District, which comprises an area of 1,327 sq. miles and forms an important part of the Central England Area. Total energy sold, 1,071.0 million kWh against 1,018.8 million kWh in the previous year, an increase of 52.2 million kWh or 5 per cent. In 1937-38 the increase was 95.0 million kWh, or 10 per cent. The total connections to the mains (consumers' apparatus) showed an increase (at 1,611,420 kW) of 14 per cent. (last year 18 per cent.). The number of new consumers connected was 41,496 (11 per cent.) compared with 42,061 (13 per cent.). The advance in the maximum simultaneous demand was under

4 per cent., whereas in 1937-38 it was 13 per cent. The quantity of electrical energy sold for all purposes when related to the approximate population of the District is perhaps the most significant pointer to the progress of electricity supply. This continues to make headway whatever unfavourable conditions prevail. Five years ago the consumption per head of population in the district stood at 374. During the subsequent four years it steadily grew to 415, 458, 520 and 572 respectively. In the year just ended it rose to 596. To meet new requirements during the year 80 miles of high-voltage mains and 283 miles of distributor cables were laid.

With regard to generation, the fuel figures reported by all the undertakings in the district showed in the aggregate a consumption of 1,090,409 tons, which works out at 1.5571 lb. per kWh generated, compared with 1.6638 lb. and 1.7391 lb. in the preceding two years.

At the Birmingham Corporation's Hams Hall "B" power station an important extension is in progress consisting, in addition to the necessary buildings and civil engineering works, of one 50,000-kW turbo-alternator and an auxiliary alternator of 3,500 kW, one boiler unit of 320,000 lb. per hr. capacity and one cooling tower of 5 million gal. per hr. The total capacity of Birmingham Corporation's plant at present is 370,000 kW. In the Stourport station of the S. W. & S. Electric Power Co. the installation of two 30,000-kW turbo-alternators and three 160,000-lb.-per-hr. boiler units was completed during the year and further extensions now proceeding consist of another 30,000-kW set and two 160,000-lb.-per-hr. boiler units, with the necessary buildings and civil engineering works, which it is anticipated will be in operation by the end of this year. The effective plant capacity at Stourport now stands at 146,000 kW. The total plant capacity in the S.W. Midlands Electricity District is now 528,220 kW, an increase of 6.72 per cent. over last year. The dismantlement of the Smethwick station and its adaptation for distribution purposes is now proceeding.

Stalybridge and District.—LARGE LOANS.—The Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board has approved a recommendation of the Electricity Committee that application shall be made for sanction to borrow £293,000 for the following purposes: Mains and services, £60,000; substation equipment, £25,000; transformers and switchgear, £5,000; meters, £50,000; domestic electrical apparatus, £30,000; motors, £3,000; public lamps, £15,000; assisted wiring scheme installations, £25,000; purchase of Glossop undertaking, £80,000.

Stoke-on-Trent.—SUPPLY TO COLLIERY.—Negotiations have now been completed for affording a bulk supply of electricity to the Great Fenton colliery. The estimated cost is £10,300.

LIGHTING SCHEME.—Recommendations of the Electricity Committee for high-power lighting in Etruria Road have been approved.

BULK SUPPLY CHARGE COMPLAINT.—Strong objection is taken by the Electricity Committee to the estimated amount of the charge for bulk supply on the hypothetical basis and it has been decided to request the electrical engineer and the North-West Midlands J.E.A. to take the matter up with the Central Electricity Board.

COOKER DECISION.—As from August 1st it is proposed that the issue of cookers to consumers under assisted wiring scheme C, rental wiring scheme E and the "all-in" tariffs shall be temporarily stopped except in special cases. A sub-committee is to consider and report on questions raised in connection with these tariffs, and meet representatives of the Electrical Contractors' Association.

Stokesley.—RURAL SUPPLY POSSIBILITIES.—The Rural District Council has received a letter from the North-Eastern Electric Supply Co. regarding plans to supply electricity to rural areas. The company stated that as far as Stanley Houses was concerned it would require a higher contribution than its usual standard charges owing to the heavy cost. Estimates had been prepared and were under consideration for supplying Rudby and new surveys had been made for Crathorne and Kirklevington. The Council approved plans by the company for an overhead line at Great Busby.

Tynemouth.—PROPOSED SUB-STATION.—A sub-station is to be erected in Billy Mill Lane by the North-Eastern Electric Supply Co., Ltd.

West Hartlepool.—ELECTRIC STREET LIGHTING.—The Town Council is to light the Brenda Road area with electricity.

TRACTION

Cardiff.—PROGRESS OF CONVERSION SCHEME.—Plans for the change from tramways to trolley-buses are taken a stage further by the recommendation of a sub-committee that sixty 70-seater trolley-buses shall be purchased.

Darlington.—MORE TROLLEY-BUSES.—After considering a report by the general manager of the Transport Department (Mr. W. J. H. Penman) the Transport Committee has decided to recommend the purchase of eight more trolley-buses.

Glasgow.—TRAMWAY EXTENSION APPROVED.—Some years ago the Corporation obtained powers to extend the tramways for about 1½ miles along Great Western Road, but they were allowed to lapse. It is now desired to carry out the extension, and last week a Parliamentary inquiry was held on the Glasgow Water and Tramways Provisional Order, 1939, under which the Corporation sought the necessary powers. The proposal was opposed by the L.N.E.R. At the conclusion of the hearing the chairman of the Commission (Sir Samuel Chapman) announced that the Order had been approved.

Grimsby.—ELECTRIC VEHICLES.—Two electric vehicles, costing £1,603, are to be bought for the use of the Cleansing Department.

Newcastle-on-Tyne.—NEW TROLLEY-BUS ROUTES.—The City Council proposes to convert the Elswick Road and Clayton Street tram routes to trolley-bus working and to extend the Denton Burn route. This will leave 31½ miles of tramway still to be converted. The City Council will apply to the Ministry of Transport for a Provisional Order.

South Shields.—TROLLEY-BUSES.—The Corporation's extended trolley-bus route from Redwell Lane to Marsden Grotto has been put into operation.

COMMUNICATIONS

China.—RADIO TELEPHONE FROM CHINA TO PHILIPPINES.—A *Reuter* message from Hong Kong states that a wireless telephone service, linking Chungking, the present capital of China, Hong Kong and Manila, is to be inaugurated about the middle of this month.

Egypt.—BROADCASTING STATIONS.—A *Reuter* report from Cairo states that the construction of a wireless transmitting station at Khartoum is now under the consideration of the Permanent Sudanese Committee. Construction is also expected to begin shortly of an £80,000 short-wave transmitting station at Cairo, which will serve the Arabic-speaking world.

Great Britain.—NEW TELEPHONE CABLE.—On Tuesday the Postmaster-General inaugurated a new co-axial telephone cable between the mainland and Jersey.

Malaya.—NEW TRANSMITTERS.—*Reuter* reports from Singapore that the British Malaya Broadcasting Corporation, which at present operates one medium-wave and one short-wave transmitter, is building another medium-wave transmitter. This is part of a scheme which the Corporation has submitted to the Straits Settlement Government for providing two daily radio programmes, one European and the other Asiatic. It is likely that the Government will, in addition, erect a short-wave transmitter. Singapore, with a population of more than half a million, has only 6,000 licence-holders.

Earth-Leakage Circuit-Breakers

THE British Standards Institution has published a Specification (No. 842) for voltage-operated air-break earth-leakage circuit-breakers for use on domestic, farm and factory premises at "medium" voltages of 250/500/660 V and from 15 up to 200 A.

This Specification was prepared at the request of the Wiring Regulations Committee of the Institution of Electrical Engineers, and it covers rating, sizes of marking, certain aspects of design and construction, performance and tests.

For the convenience of users it has been divided into two parts, the first nineteen clauses dealing with those features which are special to earth-leakage circuit-breakers, the remainder being concerned with the more general requirements for circuit-breakers, and being based on B.S. 862.*

It is important to note that the operation of the circuit-breaker depends on a *voltage* which, existing between the apparatus to be protected and the general mass of earth, is itself dependent not only on the circuit-breaker, but also on the earth electrode resistance; in assessing the performance of the circuit-breaker these two factors must therefore be considered together.

Whilst it would have been desirable from the point of view of safety to limit the tripping voltage to 30 V under all practical conditions, it was considered even more desirable to ensure that the apparatus was so constructed as to be thoroughly reliable over a long period without requiring skilled attention. A compromise has therefore been arrived at permitting the tripping voltage to reach 40 V where the earth electrode resistance is very high, but remaining below 30 V under more normal conditions.

Tests in representative rural networks have shown that in a small proportion of installations the earth electrode resistance exceeds 500 ohms. In such cases it is considered that the proper procedure would be to take steps to reduce that resistance rather than install apparatus under non-standard conditions, and Appendix D makes some suggestions as to how this may be done. If it is not possible to reduce the earth electrode resistance to 500 ohms, the manufacturer should be informed with a view to the supply of a special circuit-breaker operating at not more than 40 V with specified resistance in series.

Copies can be obtained from the British Standards Institution, Publication Department, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

* Not yet published.

FINANCIAL SECTION

New Companies. Returns of Capital. Debenture Charges. Bankruptcies and Liquidations. Reports of Electrical Companies. Dividend Announcements. Stocks and Shares

New Companies Registered

Bancroft & Partners, Ltd.—Private company. Registered July 29th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in component electrical parts, telephonic and telegraphic apparatus and appliances, &c. G. C. Bancroft, 15, Westville Road, Thames Ditton, Surrey, is the first director. Registered office: Ludgate House, 110/111, Fleet Street, E.C.4.

Electrical Wholesale Supply Co. (Leicester), Ltd.—Private company. Registered July 28th. Capital, £2,000. Objects: To carry on the business of manufacturers and repairers of or dealers (wholesale and retail) in electrical or mechanical equipment, wireless apparatus, &c. Directors: F. J. Blackwell, 72, Beechfield Avenue, Birstall, Leicester; A. S. Markwick, "Blythwood," Park Road, Birstall; and F. Simkin, Kingsway Chambers, 4, New Walk, Leicester. Secretary: M. Peberdy. Registered office: Kingsway Chambers, 4, New Walk, Leicester.

Lancashire, Midland and Scottish Relay Systems, Ltd.—Private company. Registered July 25th. Capital, £500. Objects: To construct and maintain wireless signal stations and all other stations, to receive, transmit and relay radio signals, programmes, &c. The directors are: A. R. Duckett, "Casamia," Breck Road, Poulton-le-Fylde; and J. C. Wilkinson, 409, Whalley Road, Clayton-le-Moors, Accrington.

Woodheads (Lincoln), Ltd.—Private company. Registered July 26th. Capital, £5,000. Objects: To carry on the business of manufacturers of and dealers in electrical and mechanical apparatus, and accessories and components, wireless sets, valves, gramophones and television sets, &c. The directors are: S. Woodhead, jnr., and Mrs. P. Woodhead, both of 24, Rookery Lane, Lincoln. Secretary: S. Woodhead, jnr. Registered office: 10, Exchange Arcade, Lincoln.

Companies' Returns

Statements of Capital

Wycombe (Borough) Electric Light & Power Co., Ltd.—Capital, £200,000 in 25,000 preference and 175,000 ordinary shares of £1. Return dated May 16th. 15,000 preference and 175,000 ordinary shares taken up. £172,000 paid on 15,000 preference and 157,000 ordinary shares. £18,000 considered as paid on 18,000 ordinary shares. Mortgages and charges, nil.

Halifax and Bermudas Cable Co., Ltd.—Capital, £50,000 in £5 shares. Return dated May 22nd. All shares taken up. £50,000 considered as paid. Mortgages and charges, nil.

Westool, Ltd.—Capital, £20,000 in 100 founders', 17,900 ordinary and 2,000 5 per cent. cumulative preference shares of £1. Return dated May 31st. 100 founders', 10,270 ordinary and 2,000 preference shares taken up. £6,130 paid (£1 on 5,080 shares and 15s. on 1,400 shares). £6,240 considered as paid (£1 on 5,890 shares and 5s. on 1,400 shares). Mortgages and charges, £9,000.

Electricity Distribution of North Wales and District, Ltd.—Capital, £400,000 in £1 shares. Return dated March 9th, 1939. All shares taken up. £401,087 10s. paid on 396,500 shares, plus premium of 1s. 6d. per share on 194,500 shares. £3,500 considered as paid on 3,500 shares. Mortgages and charges, £69,150.

Union Cable Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 13th, 1939. All shares taken up. £100,000 paid. Mortgages and charges, nil.

Yorkshire Woollen District Transport Co., Ltd.—Capital, £550,000 in £1 shares. Return dated May 5th, 1939. 528,000 shares taken up. £220,000 paid. £308,000 considered as paid. Mortgages and charges, nil.

Peterhead Electricity Co., Ltd.—Capital, £35,000 in £1 shares. Return dated May 8th, 1939. All shares taken up. £35,000 paid. Mortgages and charge, nil.

Liverpool Electric Cable Co., Ltd.—Capital, £300,000 in £1 shares. Return dated May 9th, 1939. 150,000 shares taken up. £127,833 paid. £22,167 considered as paid. Mortgages and charges, nil.

Mortgages and Charges

Industrial Electrical Co., Ltd.—Two debentures, charged on the company's property, present and future, including uncalled capital, both dated July 12th, 1939, to secure £1,100 and £2,900 respectively. Holder: A. G. Relf, 15, Highbury New Park, London, N.

British Electricon (London), Ltd.—Issue on July 7th, 1939, of £300 debentures, part of a series already registered.

Peto Scott Electrical Instruments (Holdings), Ltd.—Particulars filed of £5,000 debentures authorised July 14th, 1939, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £1,000.

Whitehead Switchgear & Inventions, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated July 21st, 1939, to secure £10,000. Holders: Special Areas Reconstruction Association, Ltd. (The debenture contains a covenant to create a first mortgage in favour of holders on property mentioned in the schedule to the debenture upon the granting of a lease.)

Rentelevision, Ltd.—Issue on July 14th, 1939, of £250 debentures, part of a series already registered.

Altrincham Electric Supply, Ltd.—(a) Debenture charged on 60, Stamford New Road, Altrincham, and the company's undertaking and other property, present and future, including uncalled capital, and (b) collateral mortgage on 60, Stamford New Road, Altrincham, both dated July 19th, 1939, to secure £40,000. Holders: Co-operative Insurance Society, Ltd., 109, Corporation Street, Manchester.

Domestic Electric Rentals, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated July 10th, 1939, to secure £5,000. Holders: Control Nominees, Ltd.

Vacuums, Ltd.—Satisfaction to the extent of £650, on July 13th, 1939, of debentures authorised June 19th, 1934, and registered July 31st, 1934.

Mortimer Welding Co., Ltd.—Satisfaction to the extent of £500 on June 30th, 1939, of debenture dated January 2nd, 1931, and registered January 6th, 1931.

Elliott Brothers (London), Ltd.—Satisfaction in full on June 30th, 1939, of debentures, authorised June 28th, 1916, and registered July 21st, 1916. (According to the register of mortgages, the debentures registered July 21st, 1916, originally secured £30,000.)

Increases of Capital

S.E.P., Ltd.—The nominal capital has been increased by the addition of £5,000, in £1 ordinary shares, beyond the registered capital of £100.

Corta, Ltd.—The nominal capital has been increased by the addition of £1,200 beyond the registered capital of £300. The additional capital is divided into 4,800 shares of 5s.

British Carbons, Ltd.—The nominal capital has been increased by the addition of £1,639, in £1 shares, beyond the registered capital of £2,000.

Winding-up Order Rescinded

Architectural Constructional Electrical Utilities, Ltd.—The winding-up order made against this company on July 24th and reported in our last issue was rescinded on the same day when the matter was raised again before the adjournment of the Court.

Company Liquidations

Fenemore Howlett & Co., Ltd., 107, High Street, Eton, electrical, general and wireless engineers, also at 14-16, Victoria Street, and 51, St. Leonard's Road, Windsor.—The first meetings of creditors and shareholders under the compulsory liquidation of this company were held on July 27th at the Board of Trade offices, Carey Street, W.C. The Official Receiver reported that the company was formed in January, 1931, to carry on business as electrical engineers. The issued capital was £8,520. The company appeared to have been over-ambitious in opening further branches, and it soon became apparent that large losses were being sustained. The statement of affairs filed showed liabilities of £2,443 and assets of £1,390. The failure was attributed to the decline in turnover since 1936, competition, and to thefts by an employee amounting to about £300. A resolution was passed in favour of the appointment of Mr. C. Latham, C.A., as liquidator.

The Forward Electric Co., Ltd.—Winding up voluntarily. Liquidator, Mr. A. Cripwell, 12, Cherry Street, Birmingham. Particulars of claims to the liquidator by August 30th.

Bankruptcy Proceedings

R. F. Lovegrove, carrying on business as Wallace Cook & Co., 34, Green Lane, Northwood, Mddx., electrical engineer and radio dealer.—The first meeting of creditors under this failure was held on July 25th at London Bankruptcy Buildings. The Official Receiver reported that the liabilities appeared to be approximately £300 and assets of £60. A resolution was passed in favour of the appointment of Mr. N. Osborne, C.A., of London, as trustee of the estate.

W. L. Hughes, electrical engineer, 15, Wickham Road, Beckenham, Kent.—Receiving order made July 21st on a creditor's petition.

T. E. Dawes (The Green Radio & Cycle Stores), electrical and radio engineer, Market Street, Oakengates, Salop.—Receiving order made July 26th on debtor's own petition.

S. F. Philpott (S.F.P. Electrical Co.), electrical engineer, lately residing at 74, Easington Road, Banbury, and carrying on business at North Bar Works, Banbury.—Order made June 21st suspending discharge for six months.

C. Clewer (C. & F. Radio Service), wireless dealer, 1,006, Coventry Road, Hay Mills, Birmingham.—Trustee, Mr. R. K. Clark, 37, Temple Street, Birmingham, Official Receiver, released July 20th.

W. J. Fishbourne, electrical and mechanical engineer, 7, Tynewydd Terrace, Newbridge, Mon.—First and final dividend of 1s. 6d. in the £, payable August 10th at 34, Park Place, Cardiff.

Reports and Dividends

The Brush Electrical Co., Ltd.—Presiding at the annual meeting on August 1st, Sir Ronald W. Matthews (chairman) said that the Board did not consider that any great importance should be attached to the trading results of the year under review. He would ask stockholders to bear in mind that for a number of years up to June, 1933, the date when the company was reorganised and when new management and directorate were appointed, the company had been doing very badly, evi-

dence of which was provided by the severe reduction of capital which had to be undertaken, and accordingly they were faced with the necessity of a comprehensive reorganisation of the company's works and manufacturing policy. Added to this there was the disturbance caused by the transfer of the Petters plant and business from Yeovil to Loughborough. He would like to add a word of warning about the current year. Reorganisation largely occupied their activities during the first half of this year so that the results for 1939 would still be adversely affected by this disturbance.

Dealing with the general trading during the past year, Sir Ronald said that they had recently supplied a new large Brush-Ljungstrom turbine plant totalling 75,000 kW for the Brighton Corporation Electricity Department and they had also received to date a number of orders including five large turbines ranging from 20,000 kW to 50,000 kW capacity and these would be constructed and put into service within the next two years. They had made arrangements for the provision of special tools to ensure rapid production so that the works would be able to deal with an even greater volume of business in this department in the future.

Their transformer department continued to develop and they had plans in hand for an intensive effort further to increase their trade. They had recently extended their activities in the manufacture of motors and generators to include in their range small motors from 1 HP upwards. They were also extending the department for the manufacture of switchgear and liquid starters. They had been successful in obtaining quite a number of orders of a general engineering nature which included a certain amount of work in connection with the rearmament programme. The manufacture of Diesel and oil engines was now one of their largest departments. Since the end of their last financial year they had entered into an arrangement with Blackstone & Co., of Stamford, to the effect that they took over entirely the sales of Brush horizontally imposed Diesel engines, marketing them under the name of Blackstone-Brush. Their range of Petter Diesel and oil engines would be marketed through Petters, Ltd., a wholly owned subsidiary company. The Petter department continued to have a good order book and the larger range of Petter superscavenge engines which were introduced last year continued to give satisfaction. Since December last they had acquired the business of the manufacture of the "Bates" Diesel engine previously carried on by J. Knight & Hale, Ltd., and also the business of the "Fielding" Diesel engines previously carried on by Fielding & Platt, Ltd., of Gloucester. Brush Coachwork, Ltd., continued to maintain a fairly constant order book.

Viewing the position of the company as a whole the order book was eminently satisfactory and they were now coping with the problem of turning out the work. Their total orders on hand to-day were almost four times what they were a year ago.

Falk, Stadelmann & Co., Ltd.—Presiding at the annual meeting on July 28th Mr. Max Falk (chairman) said that the whole of the trading year under review had been adversely affected by the September crisis and the continued state of tension, the conditions particularly reacting upon the company because normal building operations, upon which the demand for quite a large part of their commodities depended, had greatly diminished. As a partial offset, however, they had obtained business for electrical installation material in connection with building extensions for the national defence programme as well as for emergency lighting material for A.R.P. The cable works had been operating to full capacity and extensions were in an advanced stage. Another subsidiary, engaged in the production of high- and low-voltage distribution switchgear, was making good progress, and a new factory had been erected. The Illuminating Engineering Department had planned lighting schemes for a number of important buildings, including Weymouth bandstand pier, while their associated company, Ionlite, Ltd., had been responsible for the neon display. As to their export trade, which was largely with Empire countries, local manufacturing reacted upon the sale of certain of their products. The recent licensing of imports into New Zealand would affect their business, but, he hoped, only temporarily.

Thorn Electrical Industries, Ltd., held its annual meeting on July 31st when Mr. J. Thorn (chairman), who presided, said that the figures indicated another satisfactory year's trading with a further increase in profits. Their "Atlas" sales policy was proving very successful. The demand for "Atlas" lamps was continuously increasing, and they had been successful in securing further valuable public contracts and additional channels of distribution. The company had in hand plans for considerable extension and expansion which, when completed, would greatly increase production efficiency and considerably assist their sales campaign. On the radio side, many manufacturers suffered by the depression caused by the crisis in September, but this depression had not had the effect of reducing the net results of their company. For the coming season they had incorporated a number of new features in the 1940 range of "Ferguson" receivers. This year they were adding to their radio programme a range of television receivers, which would be released in September. They were not counting on profits from this new venture in the near future. The "Mary Ann" electrical household appliances developed during last year were now being placed on the market, and their new electric iron had already met with a favourable response. The directors felt that with the developments now in hand and given a restoration of reasonably normal trading conditions, there was no reason why their business should not continue to expand and show equally satisfactory results next year.

Studio Sun, Ltd.
Mr. J. Thorn

The Jerusalem Electric & Public Service Corporation, Ltd., held its annual meeting on July 26th, when Mr. W. Shearer (chairman), who presided, said that the year under review showed no improvement in political conditions, and the anxiety experienced in operating and administering their undertaking was in no way alleviated. It had not been possible to develop business to the same extent on their usual progressive lines, nor to produce the results which would have been achieved if their operating costs had not been adversely affected in various directions by reason of the abnormal conditions referred to. In spite of these difficulties, however, the number of consumers increased during the year by 2,008, and since the close of the financial year, a further 300 had been added, making the total to date over 18,000. Sales of electricity increased by 12½ per cent. The industrial load increased by 1,610 HP, a higher rate of increase than for the previous year, while the increase in HP of heaters connected totalled 3,134, or more than double that connected in the previous year, the total connections in these two categories now amounting to 14,674 HP. The ring main was completed by the end of the financial year, and would shortly be completely in service. The number of street lamps now in operation was 1,534, an increase of seventy-nine.

The Palestine Electric Corporation, Ltd., held its annual meeting on July 28th, when Viscount Samuel (chairman), who presided, said that throughout the year under review Palestine continued in a disturbed state. In the circumstances it was gratifying to find that the company's business suffered no shrinkage, and that the year's revenue for 1938 was at no lower level than in the previous year. There was an increase of 4,500 (6 per cent.) in the number of consumers, but there was not a corresponding increase in the energy consumed.

The capital expenditure for the year was £330,710, principally on equipment for the new Reading power house, near Tel-Aviv, which was put into commission last August, and on extensions of the distribution and transmission lines. The two new power houses at Haifa and near Tel-Aviv, together with some other developments, had involved a capital expenditure of nearly £1,000,000 in 1937 and 1938. They had, however, raised additional capital only to the extent of £500,000, the remainder having been provided by the utilisation of reserves. With regard to the current year, the first five months of 1939 had shown an increase in revenue of 6.5 per cent. on last year.

Thomas Bolton & Sons, Ltd.—Presiding at the annual meeting on July 28th, Mr. G. H. Nisbett (chairman) said that the results for the year under review could be regarded as by no means unsatisfactory in themselves, but they did show a considerable recession as compared with those of a year before. This was partly due to increased costs of fuel and labour, but mainly to a falling-off in turnover in certain of their larger departments, not because they had lost any of their old customers, but for the reason that they themselves had experienced a setback.

This year they were expecting to reap to a fuller extent the benefit of the large capital expenditure recently made on new plant. There was still more to be done in this direction, but at least they could say the goal was in sight whereby they would have plant up to date in every respect, and in all departments, and consequently their manufacturing costs on the lowest possible basis.

They had moved their head office to Liverpool, and the offices at Widnes were now devoted to works purposes. They were building new factory management offices at Froghall in furtherance of their intention to concentrate all the Staffordshire manufacturing operations at that centre. New laboratories were also being built and equipped at Froghall.

With regard to the future, during the last few months a revival in their order book had taken place, and consequently in almost all departments their factories were now working to capacity.

Britannia Electric Lamp Works, Ltd., reports a trading profit for the year to April 30th of £44,599, as compared with £47,667, and a net profit of £34,876. Tax and N.D.C. require £13,355, reserve against investment in subsidiary £12,500, and the dividend for the year is 7 per cent., less tax (against 6 per cent., less tax, for the period October 29th, 1937, to April 30th, 1938). The balance carried forward is £9,757 (against £9,618 brought in).

The Yorkshire Electric Power Co. is maintaining its interim dividend on the ordinary stock at 3 per cent., actual, and is paying 1.477d. per share on the ordinary shares issued in February.

The Electrical Distribution of Yorkshire, Ltd., has announced an interim dividend of 4½ per cent. on the ordinary stock (same).

Dublin United Tramways Co. (1896) is maintaining its interim dividend at 1 per cent., less tax.

The Northampton Electric Light and Power Co., Ltd., has declared an interim dividend of 4 per cent. on the ordinary stock (same).

The Rushden and District Electric Supply Co., Ltd., is paying an interim dividend of 4 per cent. (unchanged).

The Shawinigan Water & Power Co. has announced a second quarterly dividend of 23 cents per share (against 20 cents).

The Consolidated Gas, Electric Light & Power Co., of Baltimore, is paying a quarterly dividend of 90 cents (same).

Waygood-Otis, Ltd., has announced an interim dividend of 12½ per cent., less tax (same).

The Paterson Engineering Co., Ltd., has announced a first and final dividend of 10 per cent. (same), plus a bonus of 2½ per cent. (same), both less tax.

The Engineering & Lighting Equipment Co., Ltd.—The lists for the offer for sale of preference and ordinary shares, which were opened on July 26th—were closed the same morning, the issue having been oversubscribed.

Enfield Cable Works, Ltd., has declared an interim dividend of 6¼ per cent. less tax (same).

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets have entered upon the quietest month of the year, so far as business is concerned, and no surprise is expressed at the maintenance of listless conditions in a good many parts of the House. In point of fact, there is rather more business doing this week than there was a month ago.

International news has lately been either negative or of a less bellicose nature. The result is seen in a timid return of capital and confidence to markets such as those connected with electrical equipment and construction companies, the shares in which, it will be observed by reference to our price lists, are mostly better where changes have occurred. Friction between the United States and Japan exerts no influence upon the ordinary shares in our own commercial companies, although it indirectly affects gilt-edged quotations.

For the time being, Stock Exchange markets are without a crisis. Despite the holiday and the military influences, prices in most markets hold their ground with a fair degree of steadiness.

Gilt-edged Stocks

Mention has been made of the indirectly unfavourable effect produced upon gilt-edged securities by foreign diplomatic friction, added to which there is, of course, the expectation that the new Defence Loan may be forthcoming in the early future, regardless of the fact that Parliament is about to rise for its summer recess. Authoritative opinion still considers that the advent of a new Defence Loan will be postponed until the later autumn. Meanwhile, the price of the War Loan, bell-wether of gilt-edged securities, is heavy.

Recently-issued stocks in the electricity supply group hold their prices with little variation. For instance, the new North Metropolitan Power second debenture stock, which came out at 91¼, is quoted at 91. London Passenger Transport stocks have eased off a little, and the Home Railway market as a whole suffered relapse upon the dissatisfaction expressed by the railwaymen's unions with the suggested increase of wages offered by the railways. If the men's demand are agreed to, they will add, it is computed, an extra £2¼ millions to the wages bill of the railway companies. Southern Railway preferred is 4 points lower at 65 ex dividend.

Scarcity of Stock

Because there is so little business doing, a lively controversy has sprung up between the Stock Exchanges of London and the provinces in connection with various matters which have been, for a long time, in dispute and which have been brought to a head on account of the quietude of trade generally. One of these points relates to the delivery of stock. Buyers complain that when they purchase shares in the Stock Exchange they are frequently kept waiting well over the specified time before they can obtain completion of their bargains.

As most people are aware, the Stock Exchange deals for settlement twice a month, and if a man buys shares, say, for the settlement this week—August 3rd—the seller is given ten days in which to deliver the transfer. Failure to deliver the stock on the part of the seller gives the purchaser the right to buy it in after ten days from the previous pay-day—a practice which, by the way, is rarely successful in achieving its object. The buyer may have, upon rare occasions, to wait for several weeks before he gets his stock, although in the meantime he is at liberty to deal with it, either by sale or otherwise, if he wishes to do so.

"Not to Press"

The jobber in the Stock Exchange who sells stock which he has not got on his book, and of which he does not know a seller, argues that he makes a price with the deliberate intention of helping the public to do the business they require to, but that, if he is unable to obtain what he has already sold in advance, then it is impossible for him to do more than ask the purchaser to wait until stock comes to market, either through the medium of a deceased estate, or of any other channel.

The subject is one which particularly affects stocks and shares in the electricity supply companies, whose proprietary is of the purely investment class, rarely selling shares, and much more frequently accumulating them. The prospective purchaser who finds he is unable to carry out his wishes unless he consents for the bargain to be effected, in Stock Exchange phrase, "not to press," may not realise it, but he can be assured that a bargain done on these terms protects him at all points in the matter of receiving dividends, rights and other such advantages.

Equities v. Fixed Interest

Bearing these considerations in his mind, the investor will be the better able to comprehend the reason for a number of the improvements shown in our price-lists. A little demand arises, a few buyers appear, and the scarcity of stock stands revealed in a fashion somewhat exasperating to the man who wants to buy. To this demand, the prices naturally respond. In these present days, with unemployment returns showing better results every month, favourable dividend estimates come into circulation, and, whether business results or not, a cheerful atmosphere is created as prices improve. The fashion of the day veers again towards ordinary stocks and shares, as opposed to fixed-interest and prior-charge securities.

Price Movements

While there are no fluctuations of consequence in the Home electricity supply shares, the market for Cable and Wireless stocks is firm, the ordinary stock showing a gain of 1½ at 52½. There are nearly two dozen rises amongst the equipment and manufacturing shares. Lancashire Dynamo have regained 5s., with an advance to 3½. Improvements of 2s. 6d. have been secured by Aron, British Aluminium, Callender's, Ericsson, Murex, Westinghouse Brake. Smaller rises are to be observed in a number of other instances. Iron, steel and allied investments remain popular. Babcocks at 47s. 6d. have put on 1s. 9d. Even the rubber share market shows signs of awaking after its protracted period of stagnation.

Engineering and Lighting

Even in such days as these, the offer of new shares which present attraction, either to the investor or the speculator, can feel assured of a ready reception. Last week an issue was made by the Engineering and Lighting Equipment Co., of 7 per cent. cumulative redeemable preference of £1 each, and ordinary shares of a florin, both at par. Prompt oversubscription followed. The applicants for preference shares received about 25 per cent., and for the ordinary about 20 per cent. Dealings began in the Stock Exchange last Friday.

Usually in a case such as this the preference open round about their par price, or at a small discount, while the ordinary command a premium. In this particular instance, the conditions were reversed. Demand fastened upon the preference and the price rose to 1s. premium. The ordinary were left behind, being quoted, as they still are, about their par price of a florin. The preference have a speculative flavour through the redemption terms, whereby the shares will be repaid at 25s. by the operation of an annual redemption fund, the first instalment of which is to be set aside out of profits for the year ending March 31st, 1942. Any preference shares not previously redeemed become due for redemption on March 31st, 1954, at 25s. per share.

Electricity and Mining

Thanks to the continued prosperity of the South African gold-mining industry, profits of the Victoria Falls and Transvaal Power Company continued their upward way in 1938. Most of the great mines of the Rand take their electrical power from the company's stations. The dividend has been raised from 13¼ to 15 per cent. This is the same rate as was paid for many years up to 1934, when the capital was only two-fifths of the present amount. From the report of last week's meeting it appears that the demand for electricity is still growing apace. All of which explains the modesty of the yield on the ordinary shares, which, at 73s. 9d.—being 3/16 up on the week—show a return of £4 1s. 4d. per cent. on the money.

Recent experience of the gold industry shows to advantage against the reversal of fortunes in the base-metal mining industries. Output of tin, for instance, had to be severely curtailed by the Restriction Committee in order to save the price from collapse. Hence the severe fall in the profits of the Nigerian Electricity Supply Company, which also held its annual meeting last week. According to the chairman, a return to the former prosperity must wait on a bigger scale of operations at the local tin mines, and this, in turn, on a settlement of international troubles. After this year's reorganisation the capital of the company consists (apart from debenture stock) entirely of ordinary shares, quoted now at about 8s.

Dividends and Earnings

In looking at the question of yields on ordinary shares in the industrial, or any other, market, to-day's inquirer invariably asks how the dividend paid by a company compares with the percentage earned on the shares. In order that the reader may obtain a closer idea of the dividends and earnings upon shares in individual companies, here is a short table giving examples of electrical equipment and manufacturing companies, together with the last paid dividends and the actual earnings in respect of the period for which that dividend was distributed.

It is necessary to mention that part of the dividends last year were declared by way of bonus. For example, General Electric's 20 per cent. was announced as 10 per cent. dividend and 10 per cent. bonus. The Electric Construction dividend of 13¼ per cent. included a bonus of 3½ per cent. Here is a representative list:—

Company	Earned %	Div. %	Price	Yield £ s. d.
Associated Elec. Ind.	16.5	10	41/–	4 17 7
Crabtree Elec. Ind. 10/– shares ...	17.9	17½	22/6	7 15 4
Electric Construction	24.5	13½	35/–	7 14 3
English Electric	27.2*	10	36/3	5 10 4
Ever Ready, 5/– shares	36.9	30	19/–	7 18 0
General Electric	23.5	20	74/6	5 7 1
Lancashire Dynamo	35.9	25	62/6	7 18 8
Siemens	7.1	7½	23/9	6 6 4
Switchgear, 5/– shares	33.0	20	12/–	8 6 8
West, Allen, 5/– shares	24.8	10	6/6	7 13 10

* Earnings calculated on increased capital.

Reference to the prices of other shares in this group, which are quoted in our price lists, will show that yields range, roughly speaking, between 4½ and 8½ per cent.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price Aug. 1	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	68/3	63/9	15	15	63/9	—	4 14 4
British Power and Light	30/9	26/–	7	7	28/6	—	4 18 3
City of London	33/9	31/–	7½	7½	31/–	—	4 16 9
Clyde Valley	37/9	34/–	8	8	37/6	+6d.	4 5 4
County of London	46/9	41/9	10½	10½	43/6	+6d.	4 16 8
Edmundson's:							
7% Pref.	31/6	30/–	7	7	30/–	—	4 13 4
Ord.	27/9	23/–	9	6	25/9	—	4 13 2
Elec. Dis. Yorkshire	41/6	37/9	9	9	38/9	—	4 12 9
Elec. Fin. and Securities	47/9	45/–	12½	12½	47/6	—	5 5 3
Elec. Supply Corporation	51/9	47/6	12	12	47/6	—	5 1 1
Isle of Thanet	20/–	18/6	4	4	18/6	—	4 6 6
Lancs Light and Power	34/6	29/–	7½	7½	31/3	+6d.	4 16 0
Llanelly Elec.	22/6	21/–	5½	5½	21/–	—	5 4 9
Lond. Assoc. Electric	29/3	25/–	7	7	25/-xd	—	5 12 0
London Electric	34/3	32/–	7	7	32/6xd	—	4 6 2
London Power Deb. Red.	106½	102½	5	5	104	—	4 16 2
Metropolitan	51/–	45/3	12	12	46/3xd	−9d.	5 4 0
Midland Counties	38/9	34/–	8	8	37/–	—	4 9 0
Mid. Elec. Power	41/9	38/3	8	9	39/6	+9d.	4 11 2
Newcastle Elec.	28/9	26/6	7	7	27/–	—	5 3 8
North Eastern Electric:							
Ordinary	32/3	28/6	7	7	30/6	—	4 11 10
7% Pref.	32/6	30/–	7	7	31/6	—	4 9 0
Northampton	48/–	45/–	10	10	47/6	—	4 4 2
Notting Hill 6% Pref. (£10)	13½	12⅝	6	6	12⅝	—	4 14 1
Northmet Power:							
Ordinary	46/6	41/6	10	10	43/3xd	+9d.	4 12 6
6% Pref.	29/–	27/6	6	6	27/6	—	4 7 3
Richmond Elec.	29/–	27/3	7	7	27/6	—	5 1 10
Scottish Power	38/9	33/9	8	8	36/3	—	4 8 2
Southern Areas	22/9	19/6	5	5	20/–	—	5 0 0
South London	30/9	28/–	7	7	26/6	—	5 5 8
West Devon	23/3	22/6	5	5	22/6	—	4 9 0
West Glos.	21/3	18/–	2	2½	18/6	—	2 14 1
Yorkshire Elec.	38/6	34/9	8	8	37/6xd	+9d.	4 5 4
Overseas Electricity Companies							
Atlas Elec.	4/3	2/–	Nil	Nil	2/6	—	—
Calcutta Elec.	39/–	29/–	10*	10*	30/–	—	—
Cawnpore Elec.	34/6	28/3	10	10	28/3	—	7 1 7
East African Power	26/3	22/6	7	7	22/6	—	6 4 5
Jerusalem Elec.	24/6	23/–	7	7	23/–	—	6 1 9
Kalgoorlie (10/–)	10/6	9/6	7½	7	10/3	—	7 6 4
Madras	31/–	22/6	8*	8*	22/6	—	—
Montreal Power	35½	31	1½	1½	35	+¼	—
Palestine Elec. "A"	29/6	21/3	7½*	5*	21/3	—	4 14 2
Perak Hydro-electric	18/9	15/–	7	6	15/9	—	7 12 4
Shawinigan Power	23½	20	85cts.	83cts.	21	−¼	—
Tokyo Elec. 6%	61	42½	6	6	44½	—	13 9 8
Victoria Falls Power	73/9	60/–	12½	15	73/9	+⅝	4 1 4
Whitehall Investments Pref.	19/6	16/–	7½	7½	18/–	—	8 6 8
Public Boards							
Central Electricity:							
1950–70	112	106	5	5	110xd	+2	4 11 0
1955–75	115½	108	5	5	111½	—	4 19 6
1951–73	106½	103½	4½	4½	104½	—	4 6 2
1963–93	95½	86	3½	3½	91½	—	3 16 6
London Elec. Trans. Gtd.	88½	84	2½	2½	85½	—	2 18 6
London & Home Counties							
1955–75	107½	105	4½	4½	106½	—	4 4 6
Lond. Passenger Transport:							
A	114½	104½	4½	4½	107½	—	4 3 9
B	117½	105	5	5	106½xd	—	4 13 0
C	83½	64½	4½	4	72½	−1	5 10 4
West Midland Joint Elec., 1948–68	112½	108½	5	5	108½	—	4 12 2
Telegraph and Telephone							
American Tel. & Tel.	180	159	9	9	177½	+3	5 1 3
Anglo-Am. Tel.:							
Pref.	101½	89½	6	6	94xd	—	6 7 8
Def.	23⅜	19	1½	1½	22½	+⅜	6 16 4
Anglo-Portuguese	24/–	19/9	8	8	20/9	+9d.	7 14 2
Cable & Wireless:							
5½% Pref.	95½	75	4½	5½	89½	+1	6 3 0
Ord.	55	34	4	4	52½	+1½	7 12 5
Income	100	95½	—	—	97⅞	—	4 2 1
Canadian Marconi $1	5/6	3/9	—	Nil	5/6	—	—
Globe Tel. & Tel.:							
Ord.	31/3	23/6	7½*	7½*	30/–	—	5 0 0
Pref.	26/9	23/3	6	6	25/–	—	4 16 0
Great Northern Tel. (£10)	38	27½	20	20	29	—	6 18 0
Inter. Tel. & Tel.	10½	7	Nil	Nil	7⅞	—	—
Marconi-Marine	30/–	23/–	7½	10	27/6	—	7 5 6
Oriental Telephone Ord.	2½	46/3	12*	12*	2 7/16	—	4 16 0
Radio Corpn.	8⅝	6	8	6	6¾	−¼	—
Telephone Props.	14/–	12/9	5	6	13/9	—	8 14 6
Telephone Rentals (5/–)	10/–	8/6	10	10	9/3	—	5 8 1
Western Union	28	19½	2½	—	27½	—	—
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	7/6	3/6	Nil	Nil	6/3	—	—
4% Inc.	16	7	Nil	Nil	10	−1	—
British Electric Traction:							
Def. Ord.	1025	700	5	5	875	+25	—
Pref. Ord.	164	155	8	8	155	—	5 3 3
Bristol Trams	51/–	37/3	8	10	52/-xd	+1/16	3 17 0
Brazil Traction	13	7⅞	$1	50c.	9½	−¼	—
Calcutta Trams	25/6	22/–	8	8	23/6	+6d.	6 16 2
Cape Elec. Trams	18/–	16/9	5	6	17/6	—	6 17 2
Lancs Transport	36/6	32/6	10	10	37/6	+⅛	5 6 8
Mexican Light:							
1st Bonds	25	21	5	5	25	—	—
Rio 5% Bonds	81	47	5	5	67	—	7 9 3
Southern Rly:							
5% Prefd.	75½	48	5	5	65xd	−4	7 13 10
5% Pref.	90½	80	5	5	93½xd	—	5 7 0
T. Tilling	48/3	39/6	10	10	49/6	+2/6	4 1 0
Tilling & B.A.	53/–	50/–	10	9*	53/9xd	+2/–	3 7 0
West Riding	37/9	31/3	10	10	36/3	—	—
Equipment and Manufacturing							
Aron Electricity Ord.	32/3	28/9	15	15	31/3	+1/16	10 8
Assoc. Elec.:							
Ord.	45/3	34/9	10	10	41/–	+1/–	4 17 7
Pref.	36/6	34/–	8	8	35/–	—	4 11 5
Automatic Telephone & El.	47/6	39/3	10	12½	47/6	+1/16	5 5 3
Babcock & Wilcox	48/–	37/–	10	12½	47/6	+1/9	5 5 3
British Aluminium Ord.	58/9	48/9	12½	12½	58/9	+¼	4 5 0
British Insulated Ord.	88/–	77/–	20	20	82/6	+1/16	4 16 10
British Thermostat (5/–)	16/–	12/–	18½	18½	14/6	+9d.	6 7 7
British Vacuum Cleaner (5/–)	22/6	14/–	40	40	15/–	—	—
Brush Ord.	5/9	4/6	Nil	Nil	5/–	—	—
Callender's	92/–	60/–	20	15	67/6	+¼	4 9 4
Chloride Elec. Storage	82/3	62/6	20	15	3⅛	—	4 10 4
Consolidated Signal	96/–	80/9	36½	36½	82/6	—	8 16 9
Crabtree (10/–)	25/6	21/6	17½	17½	22/6	—	7 15 4
Crompton Parkinson:							
Ord. (5/–)	21/–	14/9	12½	15	19/6	+9d.	—
E. K. Cole (5/–)	9/–	4/–	10	Nil	5/9	+9d.	—
Elec. & Musical Industries (10/–)	14/9	8/9	10	5	10/9	+9d.	4 13 0
Electric Construction	38/6	30/6	12½	13½	35/–	—	7 14 3
Enfield Cable Ord.	58/6	2½	25	16½	51/3xd	+2/–	6 7 0
Electrical Switchgear (10/–)	27/–	23/9	16	16	23/9	—	6 14 9
English Electric	36/6	30/3	10	10	36/3	—	5 10 4
Ensign Lamps (5/–)	16/–	13/9	—	25	15/9	—	7 18 8
Ericsson Tel. (5/–)	43/–	35/–	25*	25*	42/6	+½	2 18 10
Ever Ready (5/–)	24/–	18/6	35	30	19/6	+6d.	7 18 0
Falk Stadelmann	27/–	18/9	10	6	20/-xd	+1/–	6 0 0
Ferranti Pref.	25/6	22/6	7	7	23/–	—	6 1 9
G.E.C.:							
Pref.	31/9	29/3	6½	6½	31/3	—	4 3 2
Ord.	82/–	70/9	17½	20	74/6	—	5 7 1
Greenwood & Batley	27/6	24/6	7	15	26/3	—	11 9 0
Hall Telephone (10/–)	22/3	19/3	15	15	20/–	—	7 10 0
Henley's (5/–)	21/–	17/9	20	20	19/6	+9d.	5 2 8
4½% Pref.	23/–	21/–	4½	4½	21/3xd	+6d.	4 4 8
Hopkinsons	46/3	37/3	12½	15	45/–	—	6 13 4
India-Rubber Pref.	21/3	20/–	5½	5½	20/–	—	5 10 0
Intl. Combustion	120/–	97/–	32½	32½	5 13/16	+⅛	5 12 1
J. Lucas	60/–	52/–	15	15	60/–	+⅛	5 0 0
Johnson & Phillips	41/3	32/–	12½	12½	40/–	—	6 5 0
Lancashire Dynamo	68/–	57/6	25	25	62/6	+1½	7 18 8
Laurence Scott (5/–)	12/–	10/–	15	15	10/6	—	7 2 10
London Elec. Wire	31/6	28/6	12	7½	28/9	—	5 4 4
Mather & Platt	50/–	42/6	13½	13½	44/6xd	—	6 1 6
Metropolitan Elec. Cable Pf.	21/3	21/–	5½	5½	21/3	—	5 3 6
Murex	85/9	63/9	20	20	80/–	+½	5 0 0
Pye Deferred (5/–)	13/9	7/6	25	25	8/9	—	14 5 8
Revo (10/–)	35/6	29/–	17½	17½	28/6	−9d.	6 2 8
Reyrolle	61/–	52/6	12½	12½	56/3	—	4 9 0
Siemens Ord.	26/9	20/6	7½	7½	23/9	—	6 6 4
Strand Elec. (5/–)	5/6	4/6	5	10	4/3	—	12 2 6
S. Smith (1/–)	9/9	6/–	37½	50	7/6	—	6 13 4
Switchgear & Cowans (5/–)	15/–	11/3	20	20	12/–	—	8 6 8
Telegraph Condenser (10/–)	7/6	5/–	5	—	7/6	—	—
Telegraph Construction	2½	37/6	10	10	37/6	—	5 6 8
Telephone Mfg. (5/–)	10/–	8/–	9	9	9/3	—	4 17 3
Tube Investments	91/–	82/9	23⅜	23⅜	88/9	+⅛	5 8 7
Vactric (5/–)	4/3	2/3	10	4	2/3	—	8 18 0
Vickers (10/–)	24/6	18/3	10	10	18/9	+3d.	5 6 8
Westinghouse Brake	54/9	43/9	17½	17½	51/3	+½	6 16 4
Walsall Conduits (4/–)	31/9	24/–	55	55	26/3	−9d.	8 7 8
West, Allen (5/–)	7/6	5/9	7½	10	6/6	−3d.	7 13 10

* Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1937

26423. "Telephone installations." C. Lehner N. Gadesmann K. Leichthammer and H. Leichthammer (trading as Telefonbau und Normalzeit Lehner & Co.). October 17th, 1936. (508577.)

27228. "Electrical communication systems." Telephone Mfg. Co., Ltd., and L. H. Paddle. October 7th, 1937. (Cognate application 19130/38.) (508941.)

27229. "Telephone repeaters and the like." Telephone Mfg. Co., Ltd., and L. H. Paddle. (October 7th, 1938. (508578.)

29281. "Antenna circuits for radio receivers." G. W. Johnson (Philco Radio & Television Corpn.). November 1st, 1937. (508579.)

29842. "Systems employing electric discharge devices." British Thomson-Houston Co., Ltd. October 31st, 1936. (508843.)

31843. Electrically-indicating thermometric devices." J. Pizzala (trading as Somalvico & Co. (London). November 14th, 1938. (508677.)

32428. "Electromagnetic plate clutches." S. Sokal (Anton Ryba-Ges.). November 24th, 1937. (Convention date not granted.) (508678.)

32553. "Radio receiving sets." D. J. Crowley. December 4th, 1936. (508580.)

33221. "Automatic regulating systems employing a reversible capacitor motor." British Thomson-Houston Co., Ltd. December 1st, 1936. (508581.)

33298. "Apparatus for generating high-frequency oscillations." W. S. Percival. December 2nd, 1937. (508845.)

33404. "Apparatus and method for determining the dielectric constants of electrically conductive solutions." Haardt & Co. Akt.-Ges. December 2nd, 1936. (508783.)

36207. "Collector heads or current-collectors for trolley-buses and the like." R. Livingstone and Anti-Attrition Metal Co., Ltd. December 31st, 1937. (508686.)

36264. "Electric converting arrangements." Allmänna Svenska Elektriska Aktiebolaget. January 2nd, 1937. (Addition to 407589.) (508737.)

1938

39. "Automatic synchronisation of electric oscillation generators. W. P. Wilson. January 1st, 1938. (508846.)

115. "Electric control systems." British Thomson-Houston Co., Ltd. January 2nd, 1937. (508847.)

116. "Electric control systems." British Thomson-Houston Co., Ltd. January 2nd, 1937. (508789.)

117. "Electric switchgear and casings therefor." F. Oldak. January 3rd, 1938. (508790.)

126. "Electric motor equipments." A. Tuston and Metropolitan-Vickers Electrical Co., Ltd. January 3rd, 1938. (508948.)

183. "Electrical connecting devices." A. G. Haslam and Belling & Lee, Ltd. January 4th, 1938. (508792.)

220. "Telecommunication exchange systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, and W. J. Reynolds. January 4th, 1938. (508690.)

221. "Electric condenser charging equipment." Standard Telephones & Cables, Ltd., and E. P. G. Wright. January 4th, 1938. (508691.)

222. "Radio-frequency transformers." Kolster-Brandes, Ltd., and L. G. Newman. January 4th, 1938. (508692.)

225. "Seals between the ceramic and metal parts of potheads and like electrical fittings." Standard Telephones & Cables, Ltd., T. R. Scott, and L. A. C. Pooley. January 4th, 1938. (508693.)

227. "Condenser microphones." Technical & Research Processes, Ltd., and H. J. Round. January 4th, 1938. (508694.)

228. "Television receiver apparatus." Marconi's Wireless Telegraph Co., Ltd., and G. B. Banks. January 4th, 1938. (508695.)

257. "Thermionic valves." E. Y. Robinson and Metropolitan-Vickers Electrical Co., Ltd. January 4th, 1938. (508853.)

302. "Electric motors." R. Elms. January 5th, 1938. (508799.)

309. "Means for exciting dynamo-electric machines." English Electric Co., Ltd., and E. A. Binney. January 5th, 1938. (508952.)

315. "Photoelectric determination of the colour of light." I.G. Farbenindustrie Akt.-Ges. January 19th, 1937. (508802.)

411. "Electrical control systems, particularly for electric motors driving window blinds or screens, or windows." January 6th, 1938. J. Stone & Co., Ltd., and T. Curzon. (508863.)

491. "Electric fuses." V. Hope. January 7th, 1938. (508959.)

555. "Electric couplings." A. P. Lundberg & Sons, Ltd., and G. Pegg. January 7th, 1938. (508965.)

687. "Electric water-heaters." Santon, Ltd., and H. C. Sanders. January 10th, 1938. (508866.)

926. "Electric condensers." K. N. Hawke and British Mechanical Productions, Ltd. January 11th, 1938. (508868.)

1165. "Lighting fittings." J. J. Fenn and Benjamin Electric, Ltd. January 13th, 1938. (508705.)

1600. "Cathode-ray tube apparatus." Scophony, Ltd., and A. H. Rosenthal. January 18th, 1938. (508712.)

2121. "Interpoles for commutator dynamo electric machines." A. Tustin and Metropolitan-Vickers Electical Co., Ltd. January 21st, 1938. (508872.)

2855. "Electric lampholders." W. Crisp and W. Kupper. January 29th, 1938. (508721.)

2859. "Electric discharge devices." Ferranti, Ltd., A. L. Chilcot, and L. Atkinson. January 29th, 1938. (508722.)

2908. "Windings of alternating-current dynamo-electric machines." H. West and Metropolitan-Vickers Electrical Co., Ltd. January 29th, 1938. (508875.)

4430. "Combined b.c and two-pin electrical adapters. G. Subkis. February 12th, 1938. (508882.)

4841. "Thermionic valves." M-O Valve Co., Ltd., and G. W. Warren. February 16th, 1938. (508724.)

5757. "Electric discharge devices and methods of manufacturing the same." British Thomson-Houston Co., Ltd., H. De B. Knight, and F. T. Shepherd. February 23rd, 1938. (508602.)

7881. "Alternating-current electric motors of the capacitor type." General Electric Co., Ltd., and H. C. E. Jacoby. March 14th, 1938. (508984.)

3596. "Junction boxes for electricity distributing systems." R. Bain and N. Allday. March 21st, 1938. (508608.)

9689. "Snap-action electric switches." Crabtree & Co., Ltd., H. F. McLoughlin, and B. G. Harrison. March 30th, 1938. (508733.)

11809. "Electric immersion heaters." Archibald Low Electrics, Ltd., and D. W. Low. April 20th, 1938. (508810.)

11964. "Electric switches for refrigerating apparatus." Igranic Electric Co., Ltd. April 26th, 1937. (508737.)

12452. "Snap-action electric switches." Igranic Electric Co., Ltd. April 26th, 1937. (508,899.)

12499. "Arrangement for the balancing of electrodes of electric arc furnaces." Allmänna Svenska Elektriska Aktiebolaget. September 17th, 1937. (508900.)

12962. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd. May 29th, 1937. (508,903.)

13301. "Automatic telephone selectors." Telefonaktiebolaget L. M. Ericsson. May 5th, 1937. (508985.)

15321. "Insulating beads for supporting electric conductors." General Electric Co., Ltd., J. R. Lait, and M. Pirani. May 23rd, 1938. (508,812.)

16239. "Electric cables." C. J. Beaver, E. L. Davey, and W. T. Glover & Co., Ltd. May 31st, 1938. (508908.)

17673. "High-frequency carrier signalling transmission systems." Standard Telephones & Cables, Ltd. June 26th, 1937. (Addition to 441825.) (508,816.)

19403. "Electrical resistance welding." B. Berghaus. June 30th, 1937. (Cognate application 19404/38.) (508741.)

19589. "Electric tracers for copy milling machines." British Thomson-Houston Co., Ltd. July 1st, 1937. (508734.)

21282. "Substances and compositions thereof having the property of absorbing ultra-violet light rays. F. E. E. Stockelbach. July 18th, 1938. (508818.)

26507. "Electric discharge devices." Crompton Parkinson, Ltd., and H. W. Thornbycraft. September 10th, 1938. (508825.)

27049. "Electric resistance welding." B. Berghaus. October 9th, 1937. (508921.)

27900. "Compressed-powder electromagnetic cores. C. Lorenz Akt.-Ges. September 24th, 1937. (Cognate application 27901/38.) (508754.)

28812. "Electrical measuring apparatus, more especially electricity meters." Landis & Gyr Akt.-Ges. October 22nd, 1937. (508827.)

29836. "Contacts for electric switches." Standard Telephones & Cables, Ltd. October 15th, 1937. (508,991.)

30942. "Arrangements for cooling transformer windings." Brown, Boveri & Cie Akt-Ges. October 26th, 1937. (508994.)

31733. "Bearing mountings for spindles of electricity meters." Landis & Gyr Akt.-Ges. December 21st, 1937. (508642.)

34265. "Piezo-electric crystals." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1937. (508997.)

34358. "Photo-electric telegraph transmitter." Creed & Co., Ltd. January 10th, 1938. (508650.)

36206. "Device for converting direct voltage into alternating voltage." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 14th, 1937. (508654.)

36796. "High-ohmic resistances wound from wire." R. Bosch-Ges. January 11th, 1938. (508836.)

37076. "Methods of supporting piezo-electric crystals." British Thomson-Houston Co., Ltd. December 20th, 1937. (508657.)

37077. "Piezo-electric relays." British Thomson-Houston Co., Ltd. December 23rd, 1937. (508658.)

37172. "Electric condensers for measuring dielectric constants." A. E. O'dell (Haardt & Co., Akt.-Ges.). December 21st, 1938. (508659.)

1939

2446. "Electric switches." British Thomson-Houston Co., Ltd. January 24th, 1938. (Addition to 501241.) (509000.)

9099. "Electric discharge tubes utilising secondary emission." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 25th, 1938. (508778.)

11090. "Electrical heating of liquids." S.A. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny et Cirey. August 5th, 1938. (509008.)

Architectural Lampholders

A NEW British Standard Specification, No. 841, for architectural lamp-caps and lampholders just issued gives details of the dimensions of the caps for 30 mm. and 40 mm. diameter tubular lamps, and prescribes the essential requirements for the corresponding lampholders from the point of view of safety and interchangeability. Copies of the specification may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

British Standards for A.R.P.

THE Home Office Air Raid Precautions Department has arranged with the British Standards Institution to issue a special A.R.P. series of British Standards. These will be prepared under the control of a special advisory committee and in close co-operation with the Government Departments and industry. Communications should be addressed to the British Standards Institution, 28, Victoria Street, Westminster, S.W.1.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Adwick-le-Street.—August 16th. Electricity Department. Mercury discharge lighting equipment, Great North Road. (See this issue.)

Ardrossan (AYRSHIRE).—August 21st. Town Council. Electric lighting work at Parkhouse and Whitlees housing estate (128 houses). Joint Town Clerks, Burgh Chambers (deposit £1 1s.).

Australia.—MELBOURNE.—August 15th. Posts and Telegraph Department. Lead-covered, unarmoured trunk type cable. (T. 24602/39.)*

August 22nd. Automatic exchange trunk boards. (T. 24605/39.)*

September 12th. State Electricity Commission of Victoria. Two 35,000-kVA three-phase, outdoor-type transformers. (T. 25065/39.)*

September 27th. State Rivers and Water Supply Commission. One slip-ring induction motor. (T. 25131/1939.)*

August 22nd. Underground cables. (T. 24932/39.)*

September 12th. Telephone equipment, comprising filters, indicators, terminal equipment, loading coils, &c. (T. 25398/39.)*

August 21st. Electricity Department. Control cable. (T. 25388/1939.)*

VICTORIA.—August 22nd. State Electricity Commission. Porcelain insulators. (T. 25358/39.)*

Billingham-on-Tees.—U.D.C. Electric wiring at houses in the Belasis Lane area.

Bootle.—August 12th. Borough Council. Colour-corrected mercury discharge lamps, lanterns, control equipment, time switches, tubular steel poles, brackets and cables. (July 28th.)

Burton-on-Trent.—August 29th. Electricity undertaking. Two turbo-alternators and four boilers. (July 21st.)

Conway.—August 14th. Borough Council. One electric vehicle. (See this issue.)

Croydon.—August 22nd. Electricity Department. Electric lighting and power installations at the new central offices and showrooms. (July 21st.)

Derby.—September 11th. Corporation. Automatic vehicular traffic control signals at junction of Friargate, Ford Street and Stafford Street. (See this issue.)

Dundee.—August 16th. Electricity Department. High- and low-voltage, p.i., lead-covered cables. (July 28th.)

Edinburgh.—August 19th. Corporation. Installation of an electric goods lift at Slaughter House, Gorgie. Town clerk.

East Grinstead.—August 16th. Electricity Undertaking. Fire extinguishing plant in the high-voltage switch room of the main sub-station. (See this issue.)

Egypt. — ALEXANDRIA. — August 21st. Ports and Lighthouses Administration. Two electrically driven pumping sets. (T.Y. 24916/39.)*

CAIRO.—August 16th. Ministry of Public Works. One 200-kW electric motor generator set complete with switchgear and all necessary equipment. (T. 24913/39.)*

Gravesend.—August 14th. Electricity Department. One 750-kVA transformer and e.h.v. switchgear. (July 28th.)

Harrogate.—October 1st. Electricity Department. P.i., lead-covered and armoured cables for twelve months. (July 21st.)

India.—SIMLA.—September 7th. Indian Stores Department. Electricity meters for twelve months. (T. 24782/39.)*

August 8th. Twenty-four sets of train lighting cells for the Eastern Bengal Railway. (T. 25066//1939.)*

August 22nd. One 10-kW, 222/230-V, DC generating set. (T. 25273/39.)*

Lochgelly (FIFE).—August 25th. Town Council. Twenty steel lamp standards, lamp brackets and fittings and electric bulbs for street lighting installation. Town clerk.

London.—H.M. OFFICE OF WORKS.—August 10th. Electric lighting and power installations at British Museum (N.E. Quadrant). (July 28th.)

August 23rd. Propeller type electric fans. (See this issue.)

August 17th. Electric wire and cable. (See this issue.)

ISLINGTON.—September 13th. Borough Council. One 1,500-kVA and one 5,000-kVA Scott connected transformer. (See this issue.)

SOUTHWARK. — August 21st. Borough Council. Electric lighting and power installations at new baths, Borough High Street. (See this issue.)

Manchester.—August 1st. Electricity Department. Six mercury-arc rectifier equipments and two emergency 50-kW Diesel-engine-driven generators. (July 21st.)

August 10th. Three 40,000-kVA transformers at Stuart Street sub-station and transfer from Stuart Street to Greenwood Street sub-station of two 25,000-kVA transformers and provision of new oil coolers. (July 28th.)

Newcastle-on-Tyne. — Tyne Improvement Commission. Electrical apparatus, transformers and underground cable, including lighting and heating of two 5,500-V static sub-stations at Tyne Dock. A. Blacklock, secretary, Bewick Street.

New Zealand. — CHRISTCHURCH.—September 11th. Municipal Electricity Department. Sixteen 200-kVA transformers. (T. 24886/39.)*

WELLINGTON.—September 26th. Public Works Department. One thirty-ton overhead travelling crane for Henderson sub-station. (T. 25128/1939.)*

Scunthorpe. — September 4th. Electricity Department. One sheet-steel kiosk. (See this issue.)

South Africa. — JOHANNESBURGH. — August 9th. City Council. Six AC low-voltage metal-clad switchboards. (T. 24759/39.)*

September 9th. Isolating links. (T. 24760/39.)*

August 31st Union Tenders and Supplies Board. One 50-kVA transformer and high- and low-voltage switchgear. (T. 25350/39.)*

CAPE PROVINCE.—August 14th. Municipality of Swellendam. Oil engine and alternator, control panel and voltage regulators. (T. 24748/39.)*

Southampton.—August 29th. Electricity Department. Electrical installations at Station Road schools, Sholing. (See this issue.)

Stoke-on-Trent.—September 6th. Electrical Engineer's Department. Electric cookers, washboilers, kettles, water heaters and circulators. (See this issue.)

Sunderland.—August 28th. Electricity Undertaking. P.i. cables, v.i.r. wire, meters and electric lamps for twelve months. (See this issue.)

Uruguay.—MONTEVIDEO.—August 22nd. State Electricity Supply and Telephones Administration. Rubber - insulated, tinned copper conductors. (T.Y. 25250/1939.)*

Walsall.—September 4th. Electric Supply Department. One 500-kW mercury-arc rectifier, one 6-panel DC switchboard and remote supervisory control equipment. (See this issue.)

August 25th. One 2,000-kVA, outdoor type transformer. (See this issue.)

Orders Placed

Durham.—County Council. Accepted. Electrical installation at the new boiler house, kitchen, laundry and general stores at the School Aycliffe Mental Colony (£2,200).—Cox, Walkers, Ltd.

Hastings.—Electricity Committee. Recommended. Turbine repairs (£692).—Brush Electrical Engineering Co. Switchgear modifications at Earl Street sub-station (£1,814).—Ferguson, Pailin.

Laurencekirk. — Town Council. Accepted. Installation of electric lighting in High Street (£307).—James Mitchell & Son.

London.—L.C.C. Accepted. Electrical installations at further dwellings on the Vauxhall Gardens estate, Lambeth (£812).—Holliday & Son (Electrical), Ltd.

BERMONDSEY.—Health Committee. Accepted. Portable electrocardiograph. (£206).—Cambridge Instrument Co.

ST. PANCRAS.—Contracts and Stores Committee. Recommended. Electrical domestic apparatus for twelve months: Electric stoves.—Belling & Co.; G.E.C.; English Electric Co.; Hotpoint Electric Appliance Co. Electric fires.—English Electric Co.; Belling & Co.; G.E.C. Electric washboilers.—Burco, Ltd. Electric water heaters.—Raydex Electric Heaters; Thermics, Ltd.; Johnson & Phillips; G.E.C.; Heatrae, Ltd. P.i. cables for twelve months.—Metropolitan Electric Cable & Construction Co.; Standard Telephones & Cables. AC motors to replace DC motors in connection with the change in system of supply at the North Western Polytechnic, Prince of Wales Road (£91).—Wright Electric Motors (Halifax). Switchgear at Langham sub-station: High-voltage (£736).—A. Reyrolle & Co. Low-voltage (£963).—English Electric Co.

Longbenton.—U.D.C. Accepted. Electrical installation at 106 houses at Dudley.—J. E. Fenn.

Middlesex.—Health Committee. Recommended. Electrical installation at recreation hall, Napsbury mental hospital (£525).—Giffins, Ltd. Electrical installation at Hillingdon county hospital kitchen and out-patients' department (£657) and at temporary wards (£1,082).—W. G. Perry & Co. X-ray equipment for Clare Hall sanatorium (£1,870).—A. E. Dean & Co.

Education Committee. Recommended. Electrical installation at Preston school, Wembley (£487).—Duncan Watson (Electrical Engineers), Ltd.

Sheffield.—Education Committee. Accepted. Electrical installation at Meynell Road school (£404).—T. B. & W. Cockayne, Ltd.

Stoke-on-Trent.—City Council. Accepted. One 8-cwt. electric van.—Met.-Vick. Electrical Co.

Tynemouth. — Electricity Committee. Accepted. High - voltage switchgear (£403) and low-voltage switchgear (£243).—A. Reyrolle & Co.

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 26th.

Equilock. No. 605011. Class 7 (IV). Electric machines for maintaining moving or revolving mechanism at constant speed. The Harland Engineering Co., Ltd., 196, Greengate, Manchester.

Platalux. No. 600553. Class 9 (IV). Wireless telephonic and telegraphic apparatus and scientific instruments.—Alexander Bruenner, 71, Park West, W.2.

Kubos. No. 607043. Class 11 (IV). Electric lamps.—Harry Norman Booth, trading as Booth & Son, Oldham Lighting Stores, Manchester Street, Oldham.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alexandria.—New fire station (£18,300), for Dumbarton C.C.

Alnwick.—Houses (94), at Radcliffe, Warkworth, and Shilbottle; R.D.C. surveyor.

Amble (NORTHUMBERLAND).—Houses (50) (£20,000); R. Carse & Son, Oldgate, Morpeth, Northumberland.

Batley.—New technical college, for West Riding C.C.; county architect, County Hall, Wakefield.

Bedford.—New shire hall (£130,000), and new town hall, for County Council.

Billingham-on-Tees.—Fire station, for the U.D.C. (£19,000); J. H. Hill, surveyor.

Blaenavon.—Houses (50); U.D.C. surveyor.

Blyth. — Sports stadium (£69,000); borough engineer.

Bootle.—Senior school at King Avenue; W. A. Harrison, architect, Town Hall.

Bristol.—New factory at Whitehall, for Bristol Co-operative Society, Ltd.

Buckfastleigh.—Fire station and store building (electric lighting work), for U.D.C.; W. B. Moxhay, architect, Town Hall, St. Marychurch, Torquay.

Cannock (STAFFS).—Isolation hospital on Lysway site, between Lichfield and Longdon, for Mid-Staffordshire Joint Hospital Board; F. N. Cooke and W. Norman Twist, architects, Sun Buildings, Bennett's Hill, Birmingham.

Cardiff.—Extensions to Roath power station, for Electricity Department; city electrical engineer, The Hayes.

Catford.—Shops and flats, Southend Lane; T. Spencer Bright & Co., 1, New Court, London, W.C.2.

Chester-le-Street.—Houses (60), White Hill estate, for the U.D.C.

Corby (NORTHANTS).—Houses (50), Oakley Road, for U.D.C.

Crook (Co. DURHAM).—Houses (261), for the North-Eastern Housing Association, Metrovick House, Newcastle-on-Tyne; T. Cecil Howitt, St. Andrew's House, Mansfield Road, Nottingham.

Cumberland.—Council school at Kirkbride (£21,500); J. H. Haughan, county architect, 4, Alfred Street North, Carlisle. Junior school at Silloth, for the E.C. (£17,000); Stephenson & Ross, Ltd., contractors, Boonwell Friars Lane, Barrow-in-Furness, Lancs.

Darlington.—Drill hall, for the Territorial Army (£30,000); G. Dougill and Son, builders, Chestnut Street.

Dartmouth.—Cinema, Victoria Road, for Avion Cinemas, Ltd.; A. Satchwell, architect, 6, New Street, Birmingham.

Desborough.—Extensions to factory, Rushton Road, for Rigid Containers, Ltd.

Ealing.—Houses (174-263), South-East Northolt housing scheme, for T.C.; C. W. Seddon, borough engineer, Town Hall.

Easington.—School clinic and welfare centre, for Durham C.C.; county surveyor, 43, Old Elvet, Durham.

Edmonton. — Fire station (£29,300); borough engineer.

Halesowen.—Municipal bank at High Street.

Hampshire.—Junior schools, Testwood, Totton (£15,630), for E.C.; A. L. Roberts, county architect, The Castle, Winchester.

Harrogate.—Houses (74), Grove estate (£24,203), for T.C.; borough surveyor.

Harrow. — School, Furness Road (£29,695); Janes (Builders), Ltd., 25, Victoria Street, London, S.W.1.

Hastings.—Bungalows (38), William Road, for Lancing Estates, Ltd.; A. C. Draycott, architect. Stores, King's Road; F. W. Woolworth & Co., Ltd.

Helensburgh. — Houses (40), Kirkmichael, for T.C.; burgh surveyor.

Hendon.—Secondary school; Middlesex county architect, 16, Great George Street, London, S.W.1.

Hertfordshire. — Elementary school (£26,936), Woodhall Lane, Welwyn Garden City, for E.C.; Mauger & May, architects, 22, Buckingham Gate, London, S.W.1.

Hinckley. — Houses (50), Woodland Avenue extension; U.D.C. surveyor.

Holywell.—Bus station and depot, for Crosville Motor Services, Ltd.; R. C. Cowmeadow, architect, Crane Wharf, Chester.

Huyton-with-Roby.—Fire station, firemen's cottages, superintendent's house, junction of Huyton Lane, Derby Road; Quiggin and Gee, architects, North House, 17, North John Street, Liverpool, 2.

Ipswich.—Flats, St. George's Street (£13,818); C. H. Chaston & Co.

Jarrow-on-Tyne.—Sports stadium at Jarvis sports field (£12,500); borough engineer.

Kenton.—Cinema, for Regal Cinema (Kenton), Ltd.; C. W. Dew, architect, 48, Randall Avenue, Cricklewood.

Kilsyth. — Houses (100), Barrwood (£49,506), for T.C.; burgh surveyor.

Lanarkshire. — Police station and houses, Carstairs, for C.C.; J. Stewart, county architect, 20, Albert Street, Motherwell.

Lancashire.—School of Art, Meeting House Lane, Lancaster, in connection with the Storey Institute, Lancester (£35,454); Stephen Wilkinson, architect, County Offices, Preston.

Leamington Spa.—Police and fire brigade headquarters and courthouse (£41,115), for T.C.; borough surveyor.

Leeds.—Houses (100), Belle Isle estate; borough surveyor.

Leicestershire.—Garages, gas room and flats at the police headquarters, London Road, Leicester, for the C.C. (£10,967); W. Stanger, builder, 17½, New Bridge Street, Leicester.

Lewisham. — Town hall extensions (£63,000); borough engineer. Mortuary, Hither Green (£5,800); borough engineer.

Limerick.—New hospital at Dooradoyle; P. J. Sheahan, architect.

Lincoln.—Extensions, County Hospital (£35,000).

Manchester. — New premises for Lancastrian Day School for Crippled Children (£30,000). Garages and offices, Fountain Street, Marble Street and West Mosley Street, for Lewis's, Ltd., Market Street; Robert Carlyle & Co., contractors, Elsinore Road, Old Trafford.

Midlothian.—Houses (36), Ratho, for C.C.; county architect, Edinburgh.

Morden.—Houses (70), Tudor Drive; G. T. Crouch, Ltd., Thames Street, Kingston-on-Thames.

New Malden.—Extensions to factory and laboratory, Malden Way, for Young Accumulator Co., Ltd.; Watson & Johnson, architects, Winchester House, Victoria Square, Birmingham.

Newcastle-on-Tyne.—Flats (30), Westbourne Avenue; W. W. Franklin, builder, Whinneyfield Road, Newcastle. Houses (85), Slingsby Gardens, &c.; F. E. Maughan, builder, Red Hall Drive, Newcastle. Shopping centre, Northumberland Street, Percy Street, and Prudhoe Street (£500,000), for T.C.; city architect. Houses (20), for Palmer & Wilson, Beaufront Gardens, Newcastle; F. M. Dryden, architect, New Market Street, Newcastle.

Northampton.—Grocery warehouse, Leicester Street; S. Smith. Houses (40), Duston Road; H. Holloway & Son.

Northolt.—Church, hall and school, Western Avenue; R.C. authorities.

Paisley.—Extensions to the Royal Victoria Eye Infirmary (£3,000).

Poulton - le - Fylde. — Houses (40), Blackpool Old Road; A. A. C. Moore, architect, 31, Harrington Avenue.

Rawtenstall.—Houses (54), Hall Carr, for the T.C.; J. Johnson, borough engineer and surveyor, Town Hall.

Rochester.—Houses (100), on the Temple estate, for the City Council.

Salesbury (LANCS).—Senior school off Ribchester Road; W. Stirrup, architect, Richmond Terrace, Blackburn.

Saltcoats.—Cinema, Kirkgate, for H. Kemp; J. Fairweather & Son, architects, 29, Renfrew Street, Glasgow.

Sheffield.—Houses (324), Parson Cross estate, Scheme No. 4, for Estates Committee; W. George Davies, city architect, Town Hall.

Shiney Row (DURHAM).—New school (£50,000); Wright & Kellett, Ltd., contractors, Finchale Terrace, Chester-le-Street.

Silloth.—School for the Cumberland C.C. (£17,000); Stephenson & Ross, Ltd., builders, Barrow-in-Furness.

Slough.—New factories at Bath Road, Oxford Avenue and Weston Road, for Slough Estates, Ltd.

South Shields.—Presbyterian church hall at Cleadon (£3,500); R. Summerbell and Son, builders, Rutland Street. Houses for 3,272 people, for the T.C.; borough engineer.

Stranraer.—Houses (22), for T.C.; burgh surveyor.

Sunderland.—Factory for Dawson and Usher, rope makers; T. D. Gibbons and Son, builders.

Southport.—Large extensions to Crossens Works (£500,000), for Brockhouse Engineering (Southport), Ltd.

Stamford.—Nurses' home, Stamford, Rutland and General Infirmary, for Governors; F. J. Lenton, architect.

Tenterden.—Houses (22), on a site at Dawbourne, St. Michael's, for the Town Council.

Twickenham.—Junior school, Heathfield (£40,498); W. S. Try, Ltd.

Tynemouth.—Central clinic for the T.C. (£26,000); borough engineer. Police dwellings, Stephenson Street (£5,390); Sydney Storer.

Uxbridge.—Technical institute; Middlesex county architect, 16, Great George Street, London, S.W.1.

Warrington.—R.C. senior school, Bewsey Road; Edward F. Massey, architect, 17, Museum Street.

Wells (SOMERSET).—New council offices; R.D.C. surveyor.

West Bromwich.—Houses (166), Tenscore estate; borough engineer. Factory, Friar Park; Industrial Fan & Heater Co.

West Ham.—Cleansing stations at depots; borough engineer, Town Hall.

West Riding.—Junior and infants' school at Swillington (£14,674); J. B. Bailey & Son, architects, Airedale Buildings, North Street, Keighley. General hospital, Morton, Keighley, for C.C.; county architect, Wakefield.

Willington (Co. DURHAM).—Houses (238), for the North-Eastern Housing Association; T. A. Page, Son & Bradbury, architects, 75, King Street, South Shields.

Windsor. — Houses (86) (£40,948); borough engineer.

Wolviston (Co. DURHAM).—Houses (17); Kendrews, Ltd., builders, Norton House Estate, Stockton.

Wombwell.—Houses (108), off Hough Lane, for A. Dobson, builder, Station Road, Wombwell, near Barnsley.

York.—Senior school, Bargain Lane; St. Wilfred's R.C. trustees. Baths, Hungate (£35,798); F. Shepherd & Son, Ltd. Tenement houses (32), Long Close Lane; city engineer. Schools, Burton Stone Lane and Penyghent Avenue; Education Committee.